



CASTLE INC



Owners Manual

CSI-Next: Serial #64009





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Serial No. Log

SERIAL NUMBER LOG		
Manufacturer	Model No	Serial No.
Castle	CSI – Next! Software v. 4.5	64009
Weber	ZEB-240 Polyfeed-7 Vibratory Screw Feed System w/Weber 0.5 cu. Ft. Vibratory Hopper w/Controller and Bowl Level Sensor	1122236
PDS Electric Router Spindle	3 HP RV 73/1 FP1 CPE Electric Spindle 220/380 V, 8.6/5 A 18000 RPM 300 Hz 2 Pole	1002533
ARO Tool Products – Drill	Model 8232-1	10D30013



1 Introduction

Thank you for making the CASTLE CSI-Next Pocket Screw Inserter the latest addition to your shop. Since 1985 our goal has been to manufacture and develop machines that make cabinetmaking and casework easier, faster, and more profitable for the woodworker. This machine represents our growing line of products for high output cabinet production. Castle machines are made in Petaluma, California and are manufactured to the highest standards using local vendors wherever possible.

This instruction manual is intended for use by any one working with this machine. It should be kept available for immediate reference so that all operations can be performed with maximum efficiency and safety.

Note: Do not attempt to perform maintenance or operate this machine until you have read and understand the information contained in this manual and appendices.

2 Machine Safety

2.1 Types of Warnings

Note: Obey all safety messages that follow this symbol to avoid possible injury or death.



Note: This indicates an imminently hazardous situation which, if not avoided, **WILL** result in death or serious injury.



Note: This indicates a potentially hazardous situation which, if not avoided, **COULD** result in death or serious injury.



Note: This indicates a potentially hazardous situation which, if not avoided, **COULD** result in a minor or moderate injury.

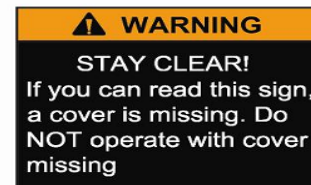


Note: This indicates useful information about proper operation of the machine.



2.2 Machine Safety Decals

Failure to observe the following warnings could result in injury



2.3 Safety Notice

CAUTION: DO NOT ATTEMPT TO OPERATE THIS MACHINE UNTIL YOU HAVE READ THIS MANUAL.

- Read the Operator Manual carefully before operating. An Operator Manual should be attached to this machine. It contains important information and warnings concerning the use and operation of this machine. Improper use of this machine may result in serious injuries to persons and property.
- Only qualified and trained operators should use this machine. **VISITORS AND CHILDREN SHOULD BE KEPT AT A SAFE DISTANCE FROM THE MACHINE AND SUPERVISED AT ALL TIMES.**
- Always wear protective eyewear and hearing protection when operating or standing near an operating machine.
- Operate this machine only when all doors and covers are in the proper position.
- Keep all body parts away from the moving parts of this machine whether it is in operation or at rest.
- Do not place hands or fingers between the work piece and any clamp or cutters at any time.



- Do not wear gloves or loose clothing (such as sweaters, jackets or dangling jewelry) when operating or stranding near an operating machine.
- Keep both hands on the work piece when initiating a cycle on this machine.
- Before attempting adjustments, maintenance, or repair, stop this machine and disconnect it from compressed air supply and main AC power. Wait for all motion to stop. Failure to disconnect this machine from its air supply and power, or failure to wait for all motion to stop could result in electrocution or injury. When attempting any kind of electrical repair work, disconnect the machine from main AC power.
- Always keep the area around the machine clean and uncluttered. Poor housekeeping could result in slips, falls or other injuries.

3 Machine Inventory

3.1 Key Features

The Castle CSI-Next comes with the following features.

- Castle Patented 6° Low Angle Pocket.
- Patented Screw-In Pocket Technology.
- Undersized pilot hole for screw retention.
- Inserted screws are below flush to prevent marring of adjacent material when stacked.
- Screw pocket sensing preventing cutting into a pre-loaded pocket
- Easy access for quick tooling changes and serviceability.
- Build in “Flip Stop” indexing system provides 3/8” gap between pocket and work piece edge.

3.2 Inventory

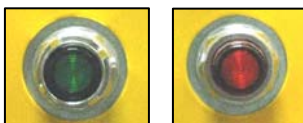
The following items are included with your Castle CSI-Next. Please take a moment to verify that all of the items listed below are included within your machine. **IF YOU ARE MISSING ANY OF THE ITEMS LISTED BELOW, CONTACT CASTLE, INC. at 80-0.282.8338.**

- o Operator Manual
 - Warranty Card
 - Parts List
- o Tool Box w/following contents
 - Collet Wrenches (4)
 - Bit Height Gauge
 - Air Tool Oil
 - (10) 7/16” Nuts for Work Top fastening
 - Rear Door latch key
- o Foot Switch w/quick disconnect
- o Screw Tube Plate
- o Stainless Steel Work Deck w/flip stops
- o Weber ZEB-240 Polyfeed 7” Screw Feed System;
- o Weber 0.5 cu. Ft. Vibratory Hopper w/Controller & Bowl Level Sensor

3.3 Identification of Operating Features & Controls



Operator PLC Display



START & STOP Button



Screw Channel



E-STOP Button



FRL



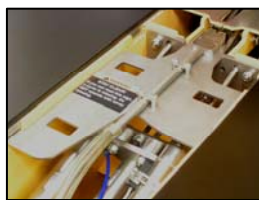
Foot Switch w/Guard



Speed Controls



Work Deck



Screw Tube Plate



Main Power & Circuit Breaker



Clamp Foot



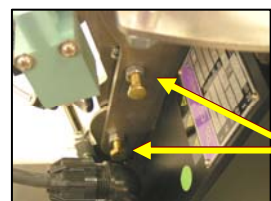
Stock Sense



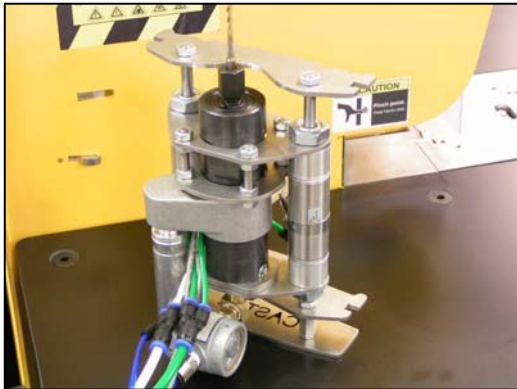
Stop Blocks



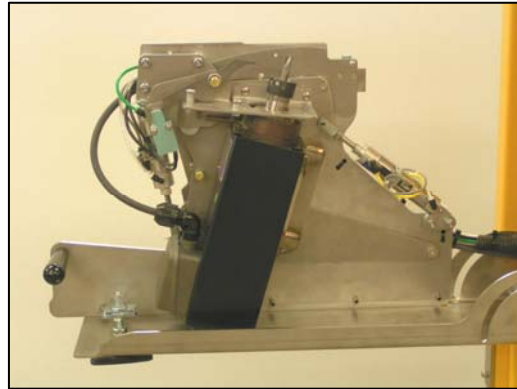
Pocket Sensor



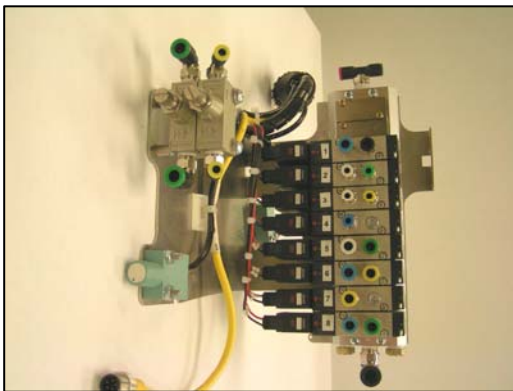
Router Adjustment Screws



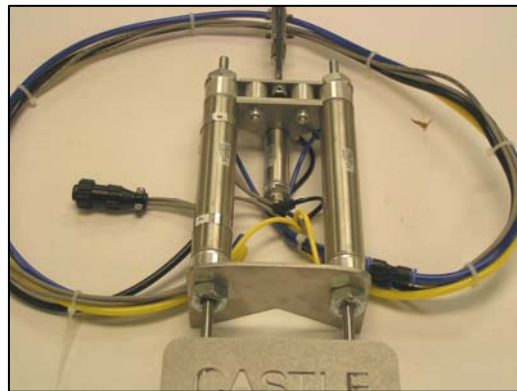
Drill Carriage



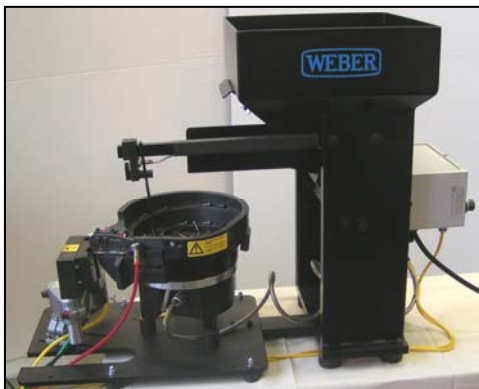
Router Carriage



Valve Assembly



Inserter Carriage



Weber Hopper & Vibratory
Feeder



Control Box

3.4 Electrical and Air Supply Requirements

1. Electrical Supply Circuits

- a. 220 V, 60Hz, Three Phase, 20 Amp Service to Machine
- b. 115 V, 60 Hz, 15 Amp Service to Screw Feeder

2. Air Supply

- a. 100 PSI, 1.5 CFM
- b. Minimum 3/8" ID Air Line to FRL (Filter/Regulator/Lubricator)

3. Dust Collection

- a. 4" Duct to Port located at rear of Case.

4 Machine Installation

4.1 Locating the Machine

Adequate space must be provided to provide full access to all sides of the machine and ensure smooth work flow. A minimum of 3 Feet of clearance is recommended behind the machine for tooling changes and maintenance access.

4.2 Setup

1. Follow the Quick Set-up Guide for removing your Castle CSI-Next and the Weber Screw Feeder System from their respective crates.
2. Locate the machine base on your production floor.
 - o The machine base *may* be bolted to the floor by removing the $\frac{3}{4}$ " carriage bolts and nuts provided as feet/levelers.
 - i. First loosen the stainless steel toe kick by loosening the nylon lock nuts on the inside of the base.
 - ii. Remove the $\frac{3}{4}$ " carriage bolts.
 - iii. Bolt base to floor.



FIG 2



FIG 1

3. With the $\frac{3}{4}$ " phenolic worktop unsecured, slide the machine case into the base until the case engages the chrome rod at the operator side of the base. (FIG 1)

- o When the case is securely engaged in the base, the wheels on the rear of the case will spin freely.
4. Adjust the height and secure the worktop using the $\frac{7}{16}$ " nuts provided, from inside the base. (FIG 2)

5. Your Weber Screw Feeder and Hopper should be positioned on a base located behind your CSI as shown. (FIG 3) The base should allow the slot on the Vibratory Feeder to cantilever out to allow the screw tube to hang freely without kinking. We recommend a base height of approximately 24" to facilitate easy access to the hopper for filling.

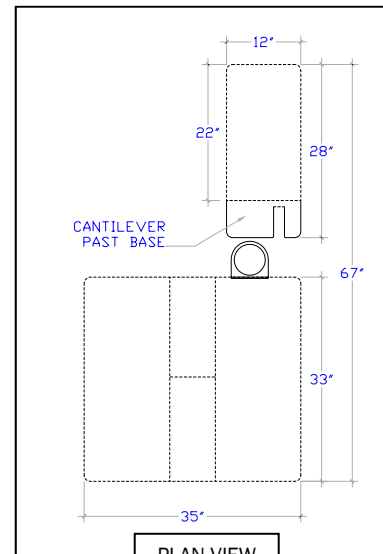


FIG 3

6. Connect the Hopper to the Feeder using the fasteners provided. (FIG 4)

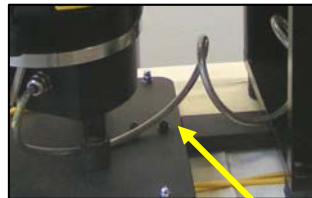


FIG 4

7. Connect the Screw Tube with the metal fitting for the Weber Vibratory Feeder as indicated using the thumb screw. (FIG 5)

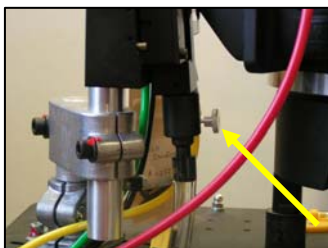


FIG 5

8. Attach the connector to the Fastener Presence Sensor as shown. (FIG 6)

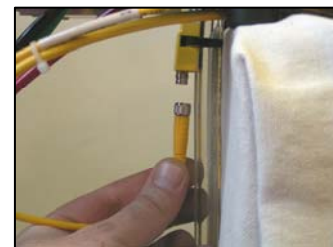


FIG 6

9. Place the Screw Tube Plate into the case on top of the Inserter Carriage and connect the other end of the Screw Feeder Tube to the Screw Tube Plate.

10. Follow the instructions with your Weber Vibratory Feeder for set up.

- o You will need to loosen the set screw at the center of the vibratory bowl and rotate the bowl to align the screw feeder escapement with the screw drop shuttle.
- o Align as indicated by the sticker on the bowl.

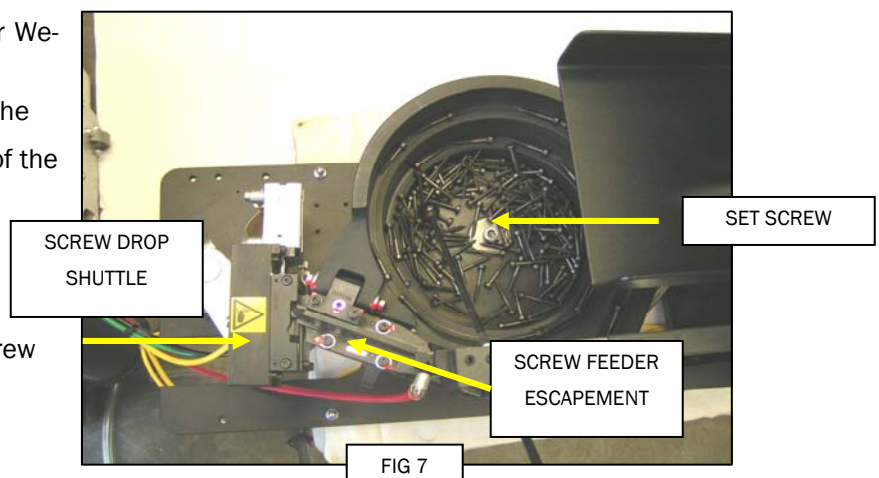


FIG 7

11. Connecting the air hoses and Fastener Presence Sensor: (FIG 8)

- o Connect the Black Oiled Air Hose into the Push-In Fitting on the Case Side without a color coded fitting.
- o Connect the Red Main Air Hose into the Push-In Fitting on the Case Side to the Red color coded fitting.
- o Connect the remainder of the hoses from the Weber Vibratory feeder as shown.
- o Plug the Vibratory Feeder into the control box at the rear of the Hopper just below the control knob for the Vibratory Feeder.



FIG 8



FIG 9

12. Attach the air hoses and fastener presence cable to the air tank using the zip tie provided. (FIG 9)

13. Attached the Foot Switch with the **Blue Quick Disconnect connector** to the line from the top of the control box with the **Blue Quick Disconnect connector**.

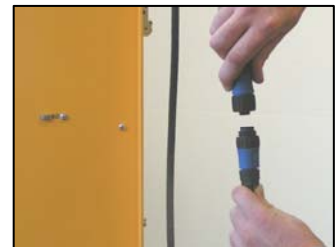


FIG 10

14. Confirm that all tool carriages are locked in place and that no hoses or cables are pinched. Be sure to remove the plastic rail pin guards on the Router Carriage that are provided as a cushion during shipping.
15. Connect air at the main air inlet on the FRL (Filter/Regulator/Lubricator). A minimum line ID of 5/16" is recommended to insure adequate air supply. Regulate the air pressure to 100 PSI.
16. Connect a 4" Duct from your main dust collection system to the dust port located at the rear of the Case.

Note: Efficient dust collection is crucial to protect internal components of the machine. Failure to provide adequate dust collection may void your warranty.

17. Plug the Weber Screw Feeder main control plug into a 110 VAC outlet.
18. Connect main power cable to 220 VAC, 3 Phase power

5 Operation

CAUTION: Read the entire operating guide carefully before running your CSI-Next machine. Make sure that you have followed all assembly and installation instructions correctly. Make sure that you are familiar with the functions described in the rest of the manual as well. Failure to follow this warning may result in serious injury to persons and property

5.1 Startup

1. Put on safety glasses and hearing protection. Make sure that any other persons are not within ten feet of the machine.
2. Confirm that all tool carriages are locked in place and that no hoses or cables are pinched.
3. Load screw feeder bowl with up to 10 pounds of screws for which the machine was designed.

Note: Before cycling the machine, be sure a screw has been delivered to the screw channel under the top cover plate. Lift the plate and visually verify.

4. Make sure that the rear service door and pusher assembly top cover plate is in place.
5. Apply compressed air and set regulator to **100 PSI**. Turn on the Main Power switch located on the Control Box at the rear of the machine. Wait a few seconds while the PLC Controls and valves are energized, and observe that the light on the red STOP Button is on. The unit is ready to start when the Red STOP Button is illuminated.
6. **Set Speed Controls:** There are two speed controls located at the rear of the machine at the Valve Assembly cover; (FIG 11) the Router Control is on the right indicated by the "R" on the Valve Assembly Cover; the Drill Control is on the left indicated by the "D" on the Valve Assembly Cover.
 - a. Close both flow controls completely by turning them fully clockwise.
 - b. Open the Router Speed Control (5) full counter-clockwise revolutions and the Drill Speed (4.5) full CCW revolutions depending on the hardness of the material being cut. *These are the settings set at the factory and may not require any further adjustment.*
 - c. To insure long tool life, use the highest speed cycle that results in a clean cut.

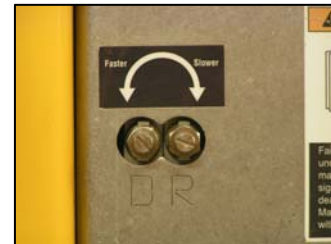


FIG 11



7. Press the **GREEN START BUTTON**. The router motor will start to spin at low speed and the green light will flash during the 10 minute warm. When the green light stops flashing, the motor will be at full RPM and the machine is ready to use.
8. Turn on the Screw Feeder and Hopper by flipping the toggle switches located on the Screw Feeder Control Box.

5.2 Operation

1. Your Weber Hopper will ensure that the screw level in the Weber Screw Feeder bowl is maintained at the proper level. Install the level arm with your Weber Hopper/Feeder using the instructions provided.
2. Using both hands, place the work piece under the Clamp Foot and against the Stock Switch.
3. Step on the Foot Switch. The Clamp Foot will extend to secure the work piece and a Pocket Cycle will begin. After two seconds, the Clamp Foot will retract to release the work piece.
4. To start another Pocket Cycle, use both hands to move and reposition the work piece under the Clamp Foot, and proceed as before.

Note: Sensors will prevent the machine from cycling into a previously cut pocket. Refer to Section 5.6.2 for further instructions on proper use of this feature

Note: Removable non-adjustable flip stops are provided to allow rapid and precise alignment of a face frame rail, locating a pocket 3/8" from the edge of the stock.

5.3 Standard Shutdown

1. Press the Red STOP Button.

Note: DO NOT BYPASS THE ROUTER COOL DOWN CYCLE BY USING THE E-STOP BUTTON, REMOVING THE TOP COVER PLATE OR OPENING THE BACK DOOR AS A MEANS TO SHUT DOWN THE MACHINE UNDER NORMAL CONDITIONS. THE BEARING LIFE OF YOUR ROUTER WILL BE AFFECTED BY FAILURE TO OBSERVE THE 2 MINUTE COOL DOWN PRIOR TO SHUTDOWN.

2. A Two Minute cool down cycle is required as a function of the router motor to improve the router bearing longevity. Wait two minutes while the Router motor cools down. During cool down, the light on the green Start Button will be on and the light on the red STOP Button will flash.

3. When the Router Motor is cooled, it will decelerate to a full STOP. The light on the red STOP Button will be on and the light on the green Start Button will be off.

Note: The machine can be started up again with a reduced warm-up time by pressing the Start Button. The 10-minute warm up of the router is required after the machine has been shut down for more than 1.5 hours or the main power has been shut off.

4. Turn off the screw feeder with the toggle switches located on the control box under at the rear of the Hopper.
5. Disconnect the main air supply to the machine.

Note: **TO RESUME POCKET CYCLES**, make sure that the Rear Service Door and the Top Cover Plate are in place. Press the green Start Button. The router Motor will accelerate to full cutting speed. The light on the green Start Button will come on and the light on the red Stop Button will be off. Turn on the Screw feeder with the toggle switches located on the control box at the rear of the Hopper.

5.4 Emergency Stop (E-STOP)

1. In the event a rapid shut down is required, depress the E-STOP button (center top).
2. Removing the top cover plate or opening the rear access door will result in immediate shut down of the machine.

Note: **DO NOT BYPASS THE ROUTER COOL DOWN CYCLE BY USING THE E-STOP BUTTON, TOP COVER PLATE OR BACK DOOR AS A MEANS TO SHUT DOWN THE MACHINE UNDER NORMAL CONDITIONS. THE BEARING LIFE OF YOUR ROUTER WILL BE AFFECTED BY FAILURE TO OBSERVE THE 2 MINUTE COOL DOWN PRIOR TO SHUT DOWN.**

5.5 Service & Maintenance

Warning: **DO NOT ATTEMPT TO CHANGE TOOLING WITH COMPRESSED AIR OR POWER SUPPLIED TO THE MACHINE.**

5.5.1 Tooling Change – Drill

1. Follow the standard shut down procedure described previously.
2. Open the rear door and remove the Drill Carriage by pulling firmly on the back plate.





3. Set the Drill Carriage on the work surface placing the rear bumpers into the holes provided on the work top. (FIG 12)
4. Using the collet wrenches provided loosen the collet. Lightly tap the collet to free the drill shank and remove the drill bit.
5. Thoroughly clean the collet of any saw dust or debris.
6. Replace the drill bit, setting the tool depth using the supplied bit gage.
7. Tighten the collet nut securely. Recheck the drill insertion depth.
8. Partially reinsert the drill carriage. Replace the cable bundle to avoid pinching and fully insert the drill assembly.
9. Close and latch the rear door.
10. Reconnect the air supply.

5.5.2 Tooling Change – Router

1. Remove the Drill Carriage as described above (Steps 1-4)
2. Pull the Router Carriage handle straight back to pull the Router Carriage out of the case and onto the rear door.
3. Take care not to pinch any cables or hoses as you pull the Router Carriage onto the open back door.
4. Loosen the collet using the collet wrenches supplied
5. Remove the worn router bit. Thoroughly clean the collet of any sawdust, oil or debris. Replace the fresh router bit.

Warning: BE SURE TO CLEAN COLLET OF DEBRIS & OIL. COLLET MUST BE LOCKED INSIDE COLLET COVER PRIOR TO INSTALLING ON ROUTER SPINDLE TO INSURE PROPER INSTALLATION.
DAMAGE MAY OCCUR IF NOT PROPERLY INSTALLED.

6. Set the tool depth using the supplied bit gauge.

Warning: IF TOOL DEPTH IS INCORRECTLY SET, DAMAGE TO TOOLING OR THE MACHINE MAY OCCUR!

7. Tighten the collet using the wrenches supplied. Recheck the router bit depth.
8. Reinstall the router carriage.
9. Partially reinsert the drill carriage and take care to locate the cable bundle to avoid pinching. Fully insert the drill carriage.

10. Close and latch the door. Rotate the screw feeder into operating position behind the back door.
11. Reconnect the air supply.

5.5.3 Tooling Change – Pusher Assembly

1. Follow the shut down procedure described previously
2. Remove the top cover plate and set it carefully aside.
3. Remove the Screw Tube Plate by lifting the right side and set it carefully aside.
4. To remove the Pusher Rod, loosen the set screw on the ½" collar.
5. Be careful to avoid dropping the collar into the case.
6. Pull the Pusher Rod out through the slots in the plates.
7. Insert the replacement Pusher Rod through the first plate and slide the collar onto the rod in between the middle and front plate.
8. Seat the Pusher Rod into the rectangular slot in the middle plate and slide the collar towards the front plate (furthest from the operator).
9. Tighten down the set screw on the collar.
10. Replace the Pusher Carriage being certain to seat the carriage fully in the slots at the case front (closest to the operator).
11. Replace the Screw Tube Plate and Top Cover Plate.

5.6 Adjustments

5.6.1 Cycle Speed

1. Two speed controls are provided for adjustment of the pocket cycle. Depending on the material being cut, you may wish to fine-tune the cut rate. Adjust the machine to cut the pocket as quickly as possible without sacrificing quality.
 - a. If the sample shifts under the clamp during the cycle or if the pocket cut appears rough, the router stroke is too fast. Slow it down by turning the router speed control (right side) clockwise.
 - b. If the pilot hole location is inconsistent, the drill is cycling too rapidly. Slow it down by turning the drill speed control (left side) clockwise. Operate the drill as quickly as possible to prevent overheating and premature bit failure.
2. Refer to Section 5.1.6 for information about the settings for your machine.

IMPORTANT: CYCLING THE MACHINE TOO SLOWLY WILL REDUCE TOOL LIFE SIGNIFICANTLY.

CAUTION: READ THE OPERATOR MANUAL CAREFULLY BEFORE SERVICING. MAKE SURE THAT YOU ARE FAMILIAR WITH THE FUNCTIONS DESCRIBED IN THIS MANUAL. FAILURE TO FOLLOW THIS WARNING MAY RESULT IN SERIOUS INJURIES TO PERSONS AND PROPERTY.

5.6.2 SCREW POCKET SENSOR GUIDE:

The machine is equipped with a pair of feelers and Hall Effect sensors designed to detect the presence of the work piece. If a pocket has already been cut in the work piece, then one or both of the feelers will pivot up into the pocket and the sensors will prevent the machine from cycling into a pocket with a pre-inserted screw. This function is designed to protect tooling and prevent damage to the router.

The sensors may need to be adjusted left to right to align with the router bit and therefore the pocket.

1. Follow the shut down procedure described previously.
2. From the rear of the case, remove the drill carriage and place in the holders on the work top.
3. Slide the Router Carriage out of the case onto the door.
4. To adjust the router sensor assembly, loosen the jamb nut to the left side of the sensor bracket. (FIG 13)
5. Turn the $\frac{1}{4}$ -20 x 1-1/2" screw counter clockwise to shift the sensor assembly to the right (from the rear of the machine). Turn the screw clockwise to shift the sensor assembly to the left (from the rear of the machine).
6. Replace the Router Carriage taking care not to pinch the cable bundle and Router Power Cord.
7. Partially reinsert the drill carriage and take care to locate the cable bundle to avoid pinching. Fully insert the drill carriage.

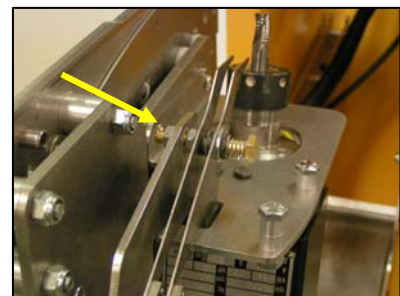


FIG 13

8. Close and latch the door. Rotate the screw feeder into operating position behind the back door.
9. Reconnect the air supply.

The Pocket Sensor has (2) possible modes of operation:

- **MODE “0” – ON**
 - o The default mode is on and the sensors will allow the machine to cut a pocket if there is no pocket detected.
- **MODE “1” – OFF**
 - o In Mode 1, the pocket sensor is off and the machine may cut a pocket even if a pocket is in the path of the cutter.

To toggle from one mode to another locate the PLC display window on the left side of the machine. Press the DOWN arrow until “MODE” is displayed. Press and hold the ESC button and simultaneously press the UP arrow to toggle between the 2 modes.

Warning: CUTTING A POCKET INTO AN EXISTING POCKET WITH A PRE-INSERTED SCREW WILL DAMAGE YOUR TOOLING AND MAY CAUSE POSSIBLE DAMAGE TO THE ROUTER MOTOR. USE CAUTION WHEN USING MACHINE IN MODE 1.

5.6.3 Web Adjustment

Depending on your application, you may want to adjust the Web of the pocket. The recommended Web thickness for a 1-1/4” long screw is ~5/8”.

Follow the procedures outlined in the tool change section of this manual to remove the drill and router carriages through the rear door.

1. With a 1/2” wrench, loosen the nut on the clevis of the pivot cylinder (closest to the operator). Refer to Set Point (B) on FIG 15.
2. To **INCREASE** the web, rotate the rod end of the pivot cylinder clockwise, deeper into the clevis to change the end of stroke

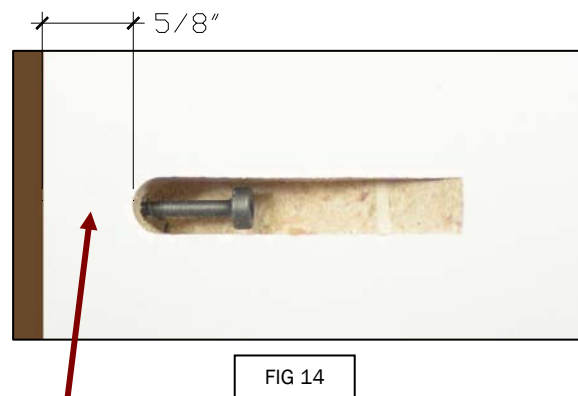


FIG 14



position. The distance that the rod-end threads change by is roughly equal to the change in web thickness. Make small adjustments until the desired web thickness is achieved. Tighten the nut to fix the position.

3. To **REDUCE** the web, rotate the rod end of the pivot cylinder counter-clockwise, out of the clevis to change the end-of-stroke position. The distance that the rod-end threads change by is roughly equal to the change in web thickness. Make small adjustments until the desired web thickness is achieved. Tighten the nut to fix the position. Be careful to leave at least 4-5 threads engaged to prevent premature failure of the clevis or cylinder rod-end.

6 Machine Set Points

6.1 Router Carriage

Your CSI machine was adjusted at the factory to match your requirements and to insure proper operation. When troubleshooting, use a caliper to verify that the following set points are met.

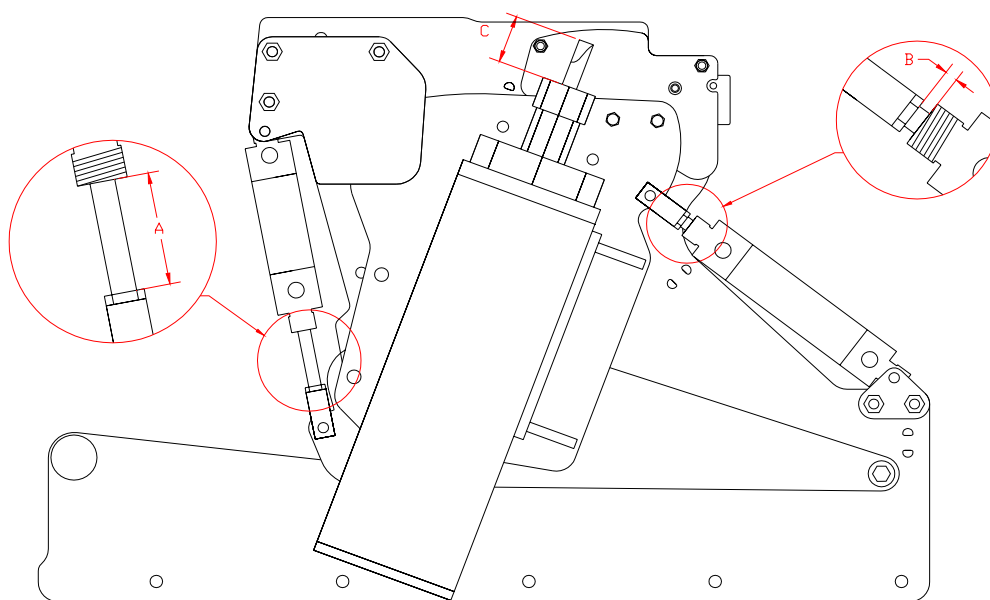
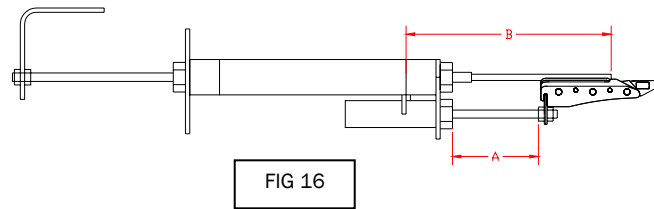


FIG 15

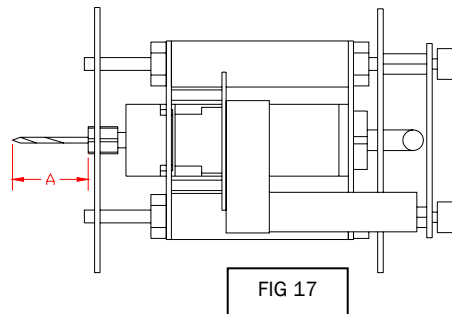
- A. The inside distance between the Lift Cylinder nose and the jam-nut on the clevis, when in a fully lowered position: **1.36"**
- B. The inside distance between the Pivot Cylinder nose and the jam-nut on the clevis, when in the forward position: **0.18"**
- C. The 3/8" router bit extension distance, measured from the top of the collet assembly; **1.22"**

6.2 Inserter Carriage



- A. The inside distance between the Channel Cylinder nose and the rear jam-nut on the Screw Channel assembly: **2.69"**
- B. The length of the Pusher Rod for 1-1/2" Screws: **6-3/8"**

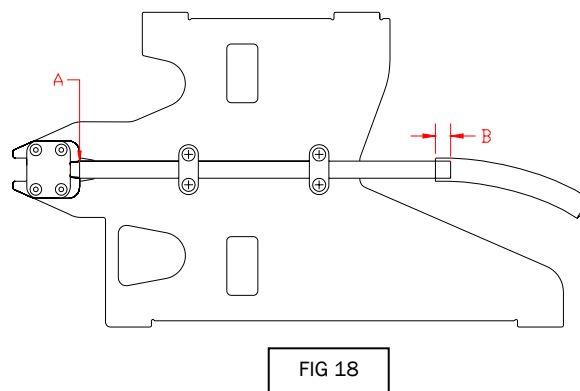
6.3 Drill Carriage



- A. The 9/64" drill bit extension distance, measured from the top of the collet assembly: **1.93"**

6.4 Screw Tube Plate

- A. The front of the Screw tube: Block Assembly as shown.
- B. Overlap of the poly feed tube with the stainless steel Screw Tube: **5/16"**



7 Warranty & Returns

7.1 Warranty

Your Castle CSI Machine shall be warranted for one (1) full year on parts except wear parts and consumables (described below) from the date of purchase against workmanship or material defects under recommended use and service. Castle, Inc. is not liable for failures or injuries due to negligence, misuse, alteration, unauthorized service, improper maintenance or accidents.

Castle, Inc., at its sole discretion, will elect to repair or replace a machine component that is found to be defective. This shall be the purchaser's sole remedy under this warranty. Castle assumes no liability for consequential, incidental, special or exemplary damages, or for loss of time, revenue or production. Further, Castle disclaims any warranty, expressed or implied, as to the merchantability or fitness of a Castle product for any particular purpose.

7.2 90 Day Refund Policy

This CSI Machine may be returned by the End User for any reason within 90 days of date of order. Upon approval by Castle, Castle will initiate an RMA and arrange for the return of the machine to Castle's factory. Upon receipt of the machine Castle will issue an applicable credit to the End User, including any freight.

Note: The machine must be returned to Castle with reasonable packaging precautions and with substantially all parts and accessories included prior to any applicable credit being issued.

7.3 Warranty Part Replacement

24 Month

Warranted parts include but are not limited to:

- o Screw Feeder System
- o PDS Electric Router Spindle
- o ARO Tool Products Drill

Excluded Wear Parts and Consumables:

- o Router & Drill Bits
- o Drill Driver Tip
- o Screw Channel Assembly
- o Screw Delivery Stop Block Assembly

Castle is obliged to provide replacement parts at no charge for 12 months.

Castle is obliged to ship UPS 3-Day Select if requested by the End User.



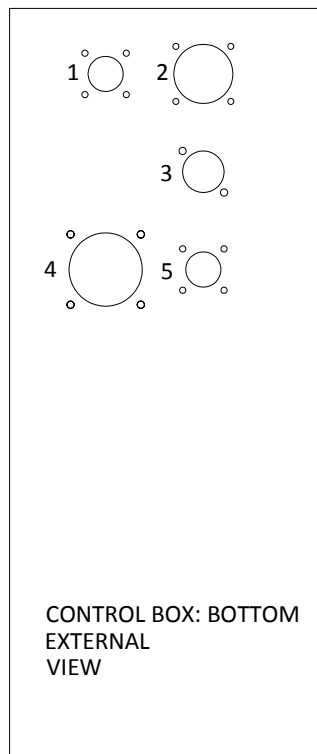
If needed Next-Day, the End User will be billed the difference between 3-Day and Next-Day Air.

Warranted parts and assemblies are to be returned to Castle by the End User. Castle will initiate an RMA and provide pre-paid shipping for these returned items. The End User will be billed for replacement parts if the returned parts are not received at the Castle factory within 30 days of the End User's receipt of the replacement parts.

8 Appendix A – Electrical System

8.1 Control Box Connector Lead

Control Box connector leads are located on the control box bottom.

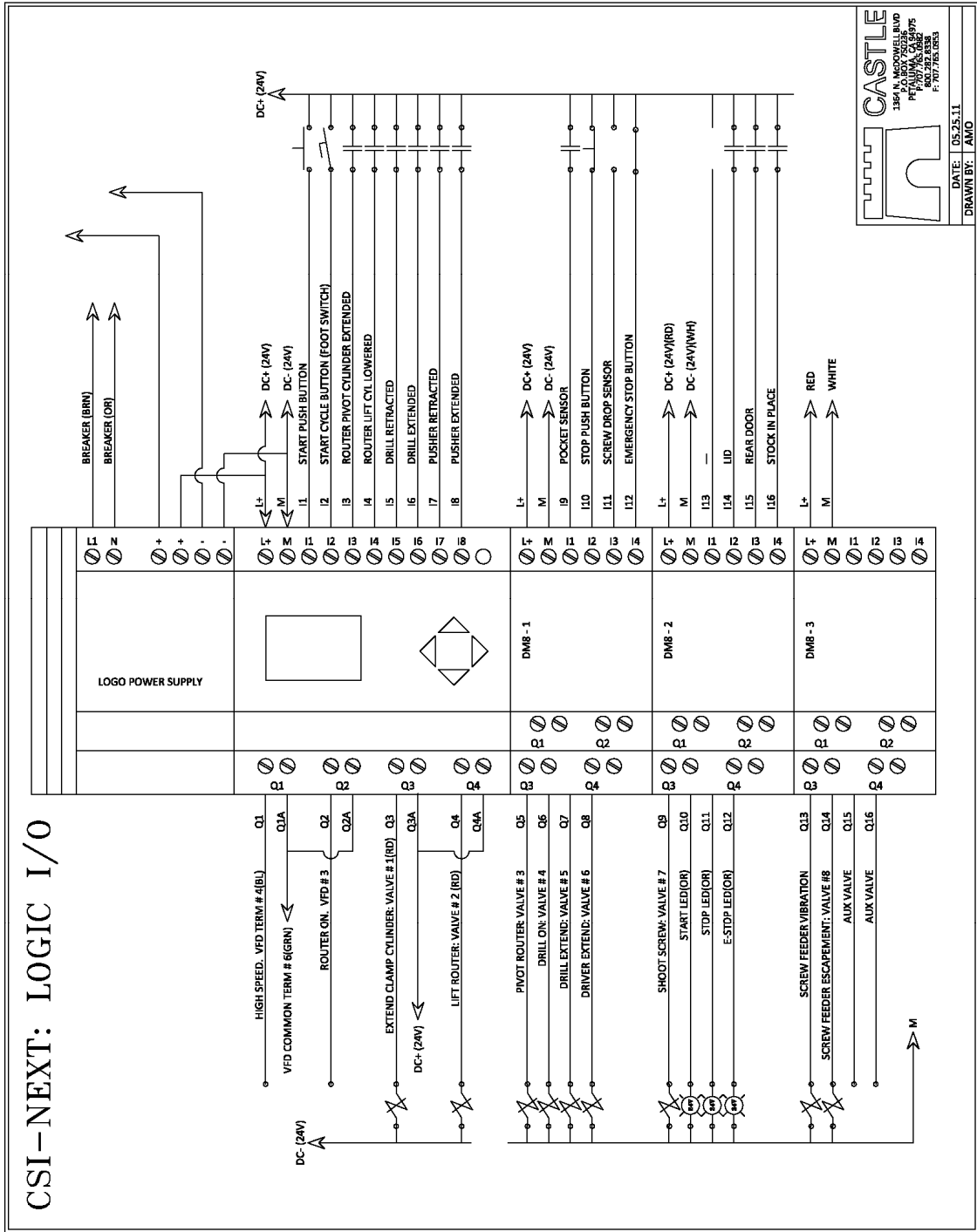


8.2 CSI Control Box Connector Configuration

CSI-NEXT CONTROL BOX CONNECTOR CONFIGURATION			
CONNECTOR	PIN#	SOURCE	DESTINATION
1: DRILL CARRIAGE	1	PLC, L, +24V (RED)	REED SWITCH RETRACTED (BR)
	2	PLC, I6 (BLUE)	REED SWITCH RETRACTED (BL)
	3	PLC, L, +24V (RED)	REED SWITCH, EXTENDED (BR)
	4	PLC, I5 (BLUE)	REED SWITCH, EXTENDED (BL)
2. ROUTER CARRIAGE	1	PLC, L, +24V (RED)	REED SW PIVOT (BR)
	2	PLC, I3 (BLUE)	REED SW PIVOT (BL)
	3	PLC, L, +24V (RED)	REED SW LIFT (BR)
	4	PLC, I4 (BLUE)	REED SW LIFT (BL)
	5	PLC, L, +24V (RED)	PROX. SW LID (BR)
	6	DM8#2, I2, (BLACK)	PROX. SW LID (BLK)
	7	PLC, M, -24V (WHITE)	PROX. SW LID (BL)
	8	PLC, L, +24V (RED)	PROX SWITCH, POCKET
	9	DM8#1, I1, (BLACK)	
	10	PLC, M, -24V (WHITE)	
3. ROUTER POWER	1	24 V +	ROUTER: L1
	2	VFD: V	ROUTER: L2
	3	VFD: W	ROUTER: LE
	4	VFD: PE	ROUTER GROUD
5: DRIVER CARRIAGE	1	PLC, L, +24V (RED)	REED SW EXTENDED (BR)
	2	PLC, I8, (BLUE)	
	3	PLC, L, +24V (RED)	REED (SW) RETRACTED (BR)
	4	PLC, I7, (BLUE)	
4. VALVES (37 PIN CONNECTOR)			
VALVE #1	1	PLC, Q3, 1 (RED)	EXTEN CLAMP CYL
	2	M	
VALVE #2	3	PLC, Q4, 1 (RED)	ROUTER LIFT
	4	M	
VALVE #3	5	DM8, #1, Q1, (RED)	ROUTER PIVOT
	6	M	
VALVE #4	7	DM8, #1, Q2, (RED)	DRILL SPIN TO PILOT VALVE
	8	M	
VALVE #5	9	DM8, #1, Q3, (RED)	DRILL CARRIAGE
	10	M	
VALVE #6	11	DM8, #1, Q4, (RED)	DRIVER CARRIAGE
	12	M	
VALVE #7	13	DM8, #2, Q1 (RED)	SCREW AIR SHOT
	14	M	
VALVE #8	15	DM8, #3, Q2, (RED)	SCREW FEEDER ESCAPEMENT
	16	M	
	17-20	EXPANSION VALVES	N/A
	21	PLC, L, +24V (RED)	PROXIMITY SWITCH, DOOR (I15)
	22	DM8, #2, I3 (BLACK)	
	23	PLC, M, -24V (BLUE)	
	24	PLC, L, +24V (RED)	PROXIMITY SWITCH, STOCK (I16)
	25	DM8, #2, I3 (BLACK)	
	26	PLC, M, -24V (BLUE)	
	27	DM8, #3, Q1, (RED)	BOWL VIBRATE (Q13)
	28	M	
	29	PLC, L, +24V (RED)	SCREW DROP SENSOR
	30	DM8, #1, I3 (BLACK)	
	31	PLC, M, -24V (WHITE)	



8.3 CSI Logic I/O



DATE: 05-25-11
DRAWN BY: AMO



8.4 Pneumatic Schedule

CSI Next PNEUMATIC SCHEDULE				
SOURCE	DESTINATION	ACTION	LINE OD	LINE COLOR
Valve 1, NO	Clamp Cylinder A	Raises Clamp	1/4"	Black
Valve 1, NC	Clamp Cylinder B	Lowers Clamp	1/4"	Blue
Valve 2, NO	Router Lift Cylinder A	Lowers Router	5/32"	Green
Valve 2, NC	Router Lift Cylinder B	Raises Router	5/32"	Clear
Valve 3, NO	Router Flow Control, Unmetered	See Router Flow Control Metered out	5/32"	Yellow
Valve 3, NC	Router Pivot Cylinder A	Pivots Router Up	5/32"	White
Valve 4, NO	--	--	--	--
Valve 4, NC	Drill, Pilot Valve-Signal input	Opens Drill Motor Valve	5/32"	Blue
Valve 5, NO	Drill Flow Control, Unmetered	See Drill Flow Control Metered out	1/4"	Green
Valve 5, NC	Drill Cylinder A	Extends Drill Carriage	1/4"	White
Valve 6, NO	Pusher Cylinder A	Retracts Pusher Assembly	1/4"	Yellow
Valve 6, NC	Pusher Cylinder B	Extended Pusher Assembly	1/4"	Blue
Valve 7, NO	--	--	--	--
Valve 7, NC	Screw Feeder, Air shot	Shoots Screw in Feed Tube to Channel	1/4"	Yellow
Valve 8, NO	Screw Feeder, Escapement	Drops Screw into Feed Tube	1/4"	Blue
Valve 8, NC	Screw Feeder, Escapement	Loads Screw in Escapement	1/4"	Green
Main Input	Filter / Regulator	Main Air Supply to Machine	3/8"	Black
Filter / Regulator	Base Manifold Input	--	3/8"	Red
Oiler	Check Valve	Prevent backflow from Air Reservoir	3/8"	Red
Check Valve	Air Reservoir	Air Reservoir for Drill Motor	3/8"	Red
Air Reservoir	Drill Pilot Valve Main input	Air to Drill Motor	3/8"	Blue
Drill Pilot Valve Main out	Drill Motor	Air to Drill Motor	--	--
BASE MANIFOLD OUT 1	SCREW CHANNEL CYLINDER	PROVIDES PRESSURE AGAINST POCKET AS SCREW IS DRIVEN	5/32"	Black
BASE MANIFOLD OUT 2	Screw Feeder Blow-off	Provides blow-off to SF Escapement	5/32"	Red
BASE MANIFOLD OUT 3	--	--	--	--
BASE MANIFOLD OUT MAIN	VALVE MANIFOLD	Air Distribution to Valves #1 to #8	3/8"	Black
Router Flow Control Metered out	Router Pivot Cylinder B	Pivots Router Down	5/32"	Yellow
Drill Flow Control Metered out	Drill Cylinder B	Retracts Drill Carriage	1/4"	Green
NO - Normally Open	NC - Normally Closed			

9 Appendix B – Functional Description

9.1 Machine Power-Up

After power is supplied to the machine, the PLC will begin the boot-up process. With the PLC in “run” mode, the display panel will indicate the total cycle count of the machine. The PLC will retain the “run” or “stop” condition through a power cycle. The terms “run” and “stop” refer to the PLC software, and not the state of the machine.

9.2 Machine Start

With the PLC in “run” mode, and the minimum conditions for safe startup are met, the red **STOP** button will be illuminated. This indicates that the machine is ready to start up. These are the minimum relevant conditions required for start-up:

<u>CONDITION</u>	<u>PLC INPUT</u>
Router not pivoted	[I-3 OFF]
Router in lowered position	[I-4 ON]
Drill fully retracted	[I-5 ON]
Drill fully extended	[I-6 OFF]
Inserter fully retracted	[I-7 ON]
Inserter fully extended	[I-8 OFF]
Pocket Sensor engaged	[I-9 ON]
E-STOP switch disengaged	[I-12 ON]
Lid in Place	[I-14 ON]
Back Door Closed	[I-15 ON]
Screw Drop Sensor	[I-11 OFF]

If any of these conditions are not met, the E-STOP button will flash, indicating the machine is not ready to be started.

9.3 Spindle Warm-Up

A warm up period (B030) of 10 minutes is required when starting the machine cold, in order to prevent damage to the router spindle bearings. This warm-up is initiated when the START button is momentarily depressed and all other startup conditions are met. During warm-up, the router spindle runs at low speed (9000 RPM). The green START button will flash and the red STOP button will be on continuously.

9.4 Startup

Upon completion of the warm-up cycle, or upon momentarily depressing the START button of a warm machine, the machine will gradually increase the RPM of the router spindle to full speed (18,000 RPM). The green START button will flash and the red STOP button will be on continuously. After reaching full speed, the machine is ready to cycle, indicated when the green START button stops flashing and remains constant and the red STOP button shuts off. A machine in this state is ready to cycle.

9.5 The Cycle

A machine cycle is initiated by depressing the foot switch [I-2 ON] while the machine is in READY mode (solid GREEN light), and the following conditions are met:

A work piece is in position and the stock sensor is engaged [I-16 OFF]

Pocket detection requirements are satisfied [I-9]

The machine has completed the prior cycle

Upon successful initiation of a cycle, the clamp cylinder (Q3) is activated and the router is fully raised into cutting position.

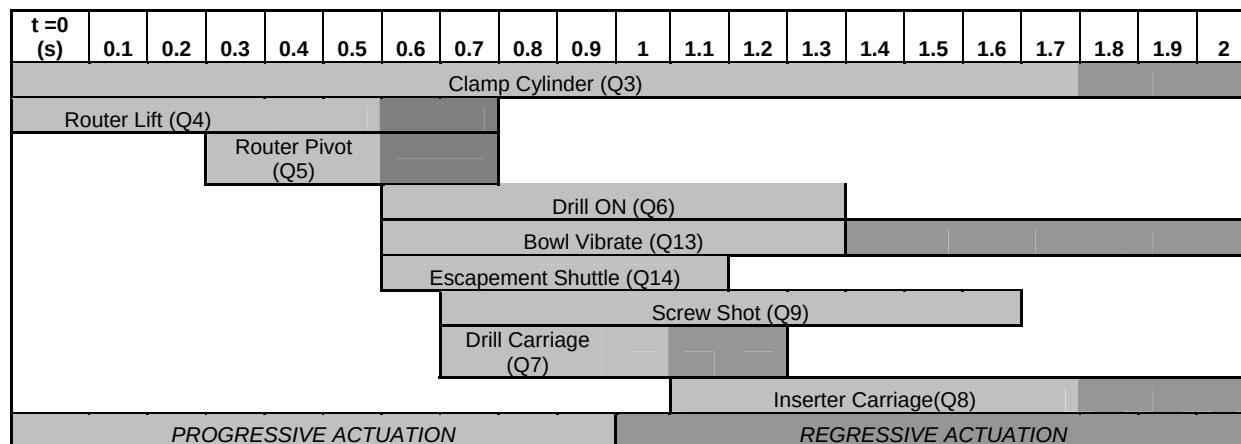
A signal (Q9) is sent to the screw feeder to begin delivery of the next screw to the channel, and the router is simultaneously pivoted (Q5) into the work piece, cutting the pocket. When the end of stroke is detected (-I3), the router pivots back while dropping out of the way of the screw delivery

mechanism. A short delay (B065) in the drop prevents the router from cutting into the web on the return arc.

Additional time delayed events are triggered by the router pivot end of stroke signal (I-3); The pilot drill air motor is turned on (Q6), and the carriage is actuated after a delay (B077) to allow the drill to reach maximum RPM and ensure the router is safely retracted. Upon activation of the drill forward limit switch (I-6), the drill carriage begins to retract immediately while the motor shuts off after a brief delay (B076) to facilitate extraction.

Also triggered by the drill retract end of stroke signal (I-5) is the inserter carriage actuation (Q8) which prevents a collision between the screw and the pilot drill and gives the screw sufficient time to drop into the delivery channel. When the driver forward limit switch is reached (I-8), the mechanism retracts, and the clamp is released after delay (B061) insuring that the inserter rod has safely retracted. The “cycle complete” signal is received when the driver carriage is fully retracted (I-7).

The machine is ready for the next cycle provided all previously stated conditions are met. The timeline below provides a pictorial representation of a complete machine cycle.



9.6 Normal Shutdown

If the machine is in READY mode (solid **GREEN** light), and the operator momentarily depresses the red STOP button, the router spindle will spin down to ½ speed for 2 minutes (B041) prior to complete shutdown.

If the machine is warming up when the STOP button is depressed, the machine will stop immediately. The machine will then require the full 10 minute warm up (B030) when restarted.

9.7 Emergency Shutdown

The machine will initiate emergency shutdown procedures if any of the following conditions occur:

- The E-STOP button is depressed (I-12 OFF)
- The top cover is removed (I-14 ON)
- The backdoor is opened (I-15 ON)
- A cycle Time-Out occurs (see below).

In the event of one of these inputs, the machine will immediately return all mechanisms to their home positions, and all motors will shutdown. The PLC display will indicate “Safety Fault”. The machine will not respond to any action until the condition is resolved.

9.8 Time-Out

If more than 5 seconds (B107) elapses during the course of a machine cycle, the machine will initiate the Emergency Shutdown procedure. The PLC display will indicate that a time-out has occurred, and a manual reset is required. The reset procedure is to toggle the E-STOP button, and restart the machine.

9.9 Weber Screw Drop Sensor

An optional sensor is available for sensing screws as they leave the Weber Screw Feeder Escapement and drop into the screw delivery tube. The PLC has three modes of operation for the optional sensor.



In the first two modes, the operator is alerted that a screw has not dropped from the escapement into the screw delivery tube.

- Mode 0 ON Red STOP lights flashes
- Mode 1 AUTO Red STOP light flashes and machine times out
- Mode 2 OFF Ignores missed screws

To change from one mode to another, scroll down to the SCREW FEED screen. Simultaneously press ESC and the DOWN arrow.

Note the parameter [B129] is the threshold value for missed screws. It is currently set to (2) but can be adjusted.

10 APPENDIX C – PLC Operation Guide

10.1 PLC Display & Key Pad

The machine is equipped with an interactive display panel on the left side. The active messages can be cycled through by pressing UP and DOWN arrows.

The following are messages that may be displayed in order of priority, lowest to highest:

1. MODE – The pocket sensor function can be toggled as described in the SCREW POCKET SENSOR GUIDE portion of this manual. 0 – Normal, 1 – Sensor Bypass
2. MODE – The screw delivery function can be toggled as described in the WEBER SCREW DROP SENSOR Portion of this manual. 0 – ON, 1 – AUTO, 2 – OFF.
3. HOURS >RST / TOTAL – The PLC monitors how long the router has been running. This is primarily a diagnostic and maintenance tool. To reset: While pressing and holding the ESC button, press the RIGHT arrow.
4. CYCLES <RST / TOTAL – The PLC monitors the cycle count. To reset: While pressing and holding the ESC button, press the LEFT arrow.
5. COOL DOWN: The cool down time and elapsed time is displayed while the machine is in cool down mode.
6. WARM UP: The warm up time and elapsed time is displayed while the machine is in warm up mode.
7. SAFETY FAULT – This message will appear if any of the following occur: Rear Door open, Top Cover open, Cycle Time Out, or E-STOP button engaged.

10.2 CSI Software Update

Occasionally, Castle may develop an improved or “feature added” version of the operating software for your machine. When an update becomes available, you will be provided with an EEPROM card.

Prior to updating the software, please record the total cycle count and machine hours in the maintenance log, as these values will be reset.

10.3 E-Prom Loading Instructions

1. Navigate to the “time/date” display with down arrow.
2. Press ESC.
3. Press OK to stop the program.
4. Navigate to “Yes” with down arrow.
5. Press OK to confirm.
6. Navigate to “Card” with down arrow.
7. Press OK.
8. Navigate to 2nd option with down arrow, “Card→PLC”
9. Press OK.
10. Navigate to “Yes” with down arrow.
11. Press OK to confirm. Hourglass will appear during transfer.
12. Navigate to “Start” with down arrow.
13. Press “OK”.

The updated program is now running.

10.4 Input/Output Monitoring

The PLC display can be a useful tool when troubleshooting input/output devices such as limit switches and solenoid valves.

1. Navigate to flashing time/date display with down arrow.
2. Press the right arrow until the “I”: is displayed. The numbers correspond to specific input status. A highlighted number indicates closed contacts.
3. Press the right arrow until the O: is displayed. The numbers correspond to specific output terminal status. A highlighted number indicates ON.
4. Return to the flashing time/date display with left arrow, and up arrow to view specific active messages. A high priority message will automatically appear when generated, for example, “SAFETY FAULT”.

Refer to the PLC I/O wiring diagram for reference when monitoring I/O on the display.

10.5 Parameter Adjustment

1. With the machine stopped and the PLC in “run” mode, key down until the time and date display is active.
2. Press ESC.
3. Key down to “Set Param” and press OK.
4. Key up or down to locate the parameter you wish to edit.
5. Press OK.
6. Key left or right until the place holder you wish to edit is flashing.
7. Key up or down to modify the value.
8. Press OK to accept.
9. Press ESC twice to return to the normal display mode. The time and date display should be active.
10. Record any parameter value changes in the maintenance log.

10.6 PLC Parameter List

Version	CSI REV 4-5.lsc		
IDENTIFIER	TYPE	DESCRIPTION	DEFAULT VALUE
B011	ON-DELAY	POCKET DETECTION RESET TIMER	1.50 S
B018	PULSE	PUSHER EXTENSION	0.35 S
B030	ON-DELAY	SPINDLE WARM UP	10.0 M
B033	OFF-DELAY	WARM-UP RESET DELAY	1.50 H
B041	OFF-DELAY	SPINDLE COOL DOWN	2.00 M
B043	OFF-DELAY	SHAKER BOWL TIMER AFTER CYCLE	5.00 S
B046	ON-DELAY	SPIN UP (LOW TO HIGH SPEED)	12.0 S
B054	ON-DELAY	ROUTER PIVOT DELAY	0.30 S
B061	OFF-DELAY	CLAMP RELEASE DELAY	0.10 S
B062	PULSE	SCREW FEED SIGNAL	0.90 S
B064	ON-DELAY	ROUTER LIFT DELAY	0.00 S
B065	OFF-DELAY	ROUTER DROP DELAY	0.20 S
B076	OFF-DELAY	DRILL MOTOR OFF DELAY	0.20 S
B077	ON-DELAY	DRILL EXTENSION DELAY	0.10 S
B107	ON-DELAY	MACHINE TIME-OUT	3.00 S
B113	OFF-DELAY	SHAKER BOWL BLAST DURATION	1.00 S
B115	ON-DELAY	SHAKER BOWL TIMER AT STARTUP	15.00 S
B129	UP/DOWN COUNTER	# OF MISSED SCREWS BEFORE RETRACTION	EXACTLY 2

10.7 Error Codes

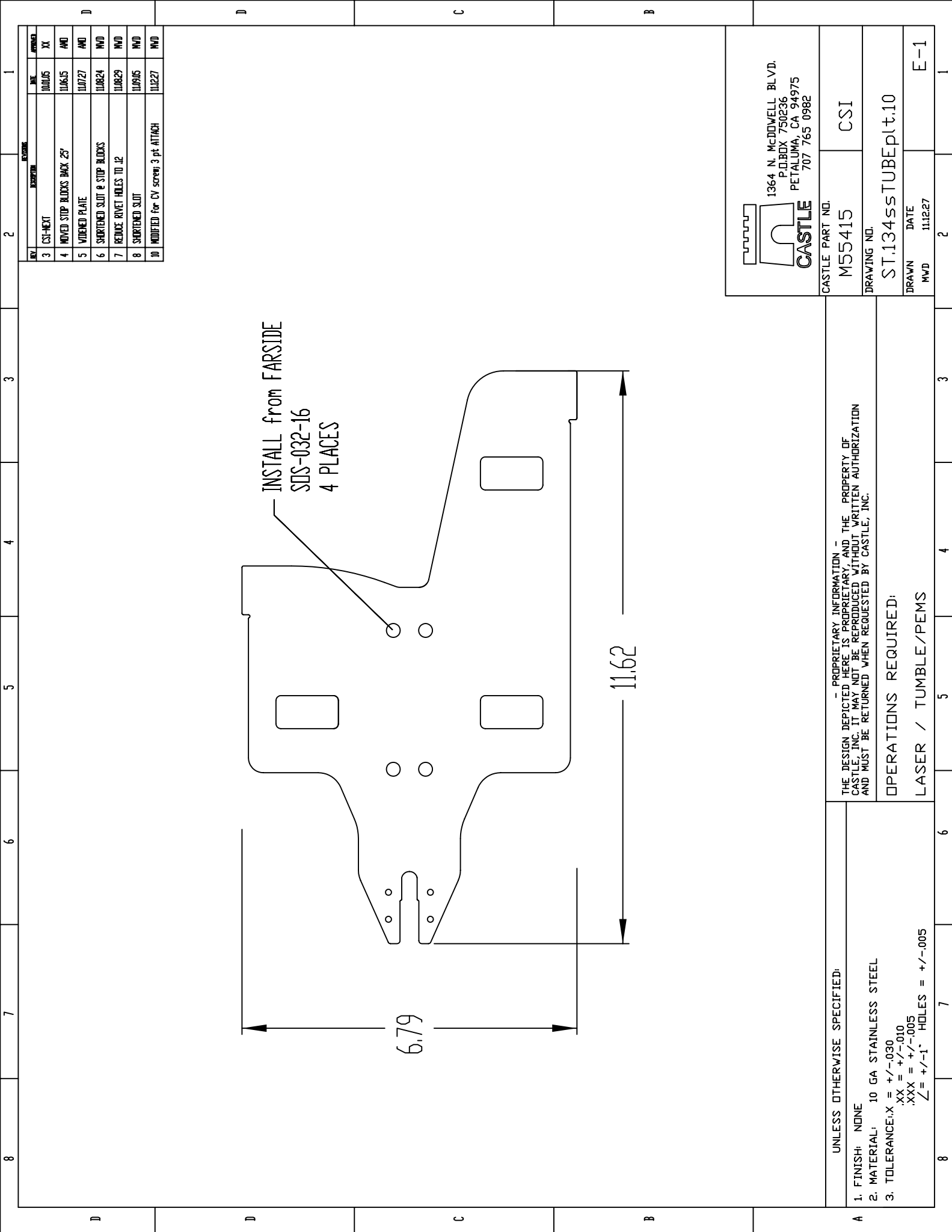
ERROR CODE	MESSAGE TEXT	TROUBLESHOOTING
ER 001	SAFETY FAULT TOP COVER	1. CLOSE THE TOP COVER 2. CHECK SWITCH I-14
ER 002	SAFETY FAULT REAR DOOR	1. CLOSE THE REAR DOOR 2. CHECK SWITCH I-15
ER 003	SAFETY FAULT E-STOP	1. RETRACT THE BUTTON 2. CHECK SWITCH I-12
ER 004	SAFETY FAULT TIME OUT	1. TOGGLE E-STOP TO RESET. 2. CHECK AIR SUPPLY. 3. CHECK TOOLING. 4. CHECK FOR JAMMED SCREW
ER 005	CHECK AIR SUPPLY. SEE OPER. MANUAL	1. CHECK AIR SUPPLY. 2. CHECK THAT THE FOLLOWING INPUT CONDITIONS ARE MET: I-3 OFF, I-4 ON, I-5 ON, I-7 ON. 3. ADJUST LIMIT SWITCHES IF NECESSARY.
ER 006	FEED FAILURE	1. CHECK SCREW SUPPLY TO SCREW FEEDER. 2. CHECK FEEDER ESCAPEMENT FOR JAMMED SCREW.

11 Appendix D - Glossary of Terms

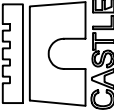
Term	Meaning
Emergency Stop Devices	Buttons or interlocks used for emergency stopping. This STOP system will STOP the router from spinning immediately and return the machine to its starting position. The initial start up sequence must be followed to restart the machine
Escapement	The channel section of the screw feeder where screws are loaded prior to being delivered through the screw tube to the machine.
FRL	Filter-Regulator-Lubricator for regulating air pressure and providing lubrication for the Pilot Hole Air Drill.
Interlock	Electrical safety device that shuts the machine down if a cover or door is removed from its closed, protective position.
PLC	Programmable Logic Controller. The digital computer in the control box that signals the machine sensors, actuators, motors and cylinders
Pocket	The depression routed into the material to allow for “toe screw mortise” joinery.
Pocket Cycle	The procedure, by which the machine clamps the work piece, routs the mortising pocket, drills the pilot hole, inserts the wood screw and releases the work piece.
Pocket Sensor	Assembly mounted to Router Carriage that includes a pair of feelers and Hall Effect sensors that detect the presence of the work piece.
Tool Carriages	Removable assemblies for the drill, router & inserter assemblies.
Screw Channel	Assembly that receives the delivered screw from the Vibratory Screw Feeder and guides the screw into the pocket.
Stock Sense	Switch, that when activated, senses material stock is in place and the cycle can begin
Stop Blocks	Laminations on the Screw Tube Plate that stop the screw as it is being delivered to the screw channel.
Web	The offset distance from the end of the pocket to the edge of the work piece.

Work Deck	Stainless Steel Assembly that sits on top of the case nearest the operator which includes removable flip stops.
-----------	---





REV	DESCRIPTION	DATE	APPROVED
3	CSI-NEXT	10.0.05	XX
4	MOVED STOP BLOCKS BACK 25'	11.06.15	MVD
5	VOUCHED PLATE	11.07.27	MVD
6	SHORTENED SLOT & STOP BLOCKS	11.08.24	MVD
7	REDUCE RIVET HOLES TO 12	11.08.29	MVD
8	SHORTENED SLOT	11.09.05	MVD
10	MODIFIED for CY screw 3 pt ATTACH	11.12.27	MVD



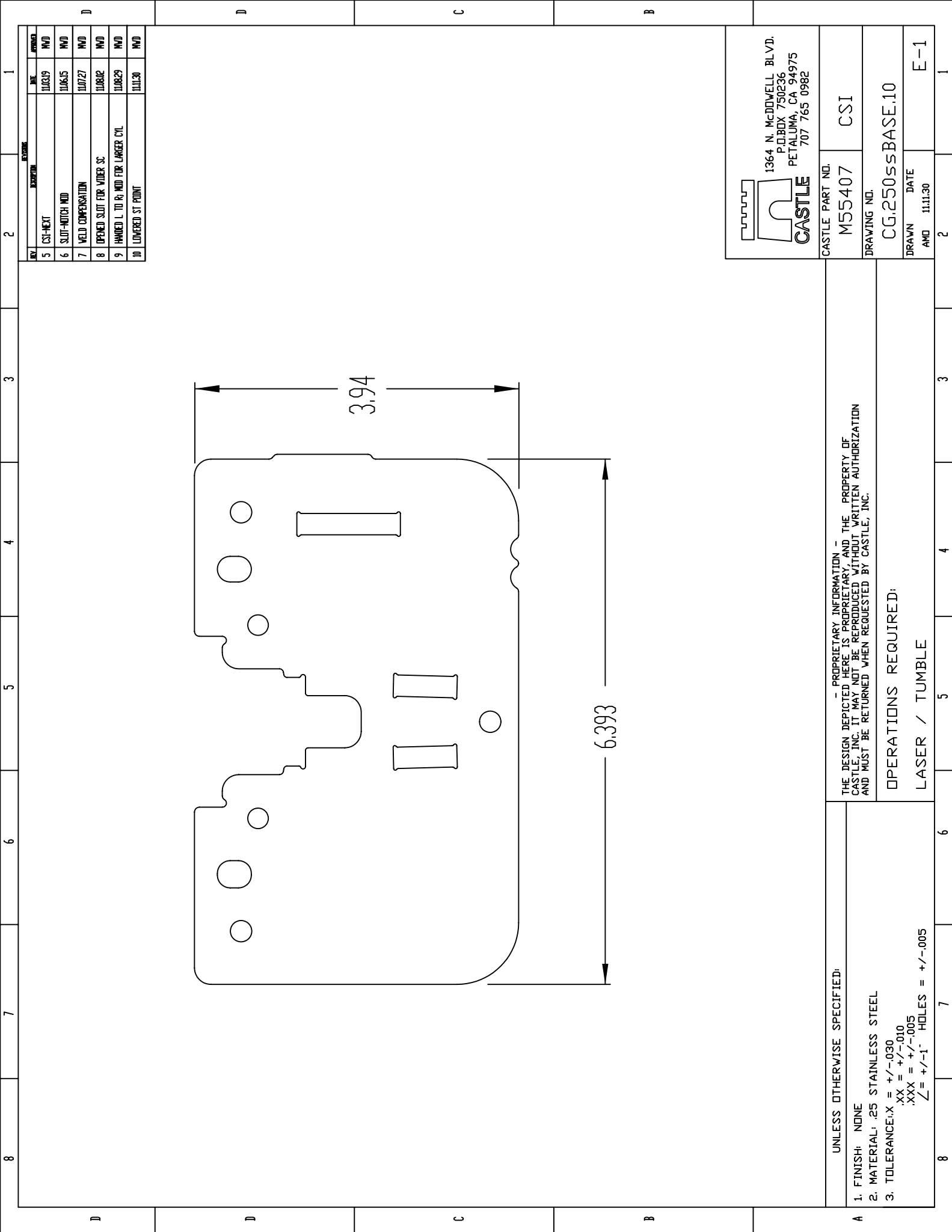
1364 N. McDOWELL BLVD.
P.O.BOX 750236
PETALUMA, CA 94975
707 765 0982

CASTLE PART NO.	M55415	CSI
DRAWING NO.		
ST.134ssTUBEpt.10		
DRAWN	DATE	E-1
MVD	11.12.27	

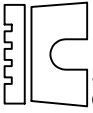
- PROPRIETARY INFORMATION -
THE DESIGN DEPICTED HERE IS PROPRIETARY, AND THE PROPERTY OF
CASTLE, INC. IT MAY NOT BE REPRODUCED WITHOUT WRITTEN AUTHORIZATION
AND MUST BE RETURNED WHEN REQUESTED BY CASTLE, INC.

OPERATIONS REQUIRED:
LASER / TUMBLE/PEMS

- UNLESS OTHERWISE SPECIFIED:
1. FINISH: NONE
 2. MATERIAL: 10 GA STAINLESS STEEL
 3. TOLERANCE: X = +/- .030
XX = +/- .010
XXX = +/- .005
Z = +/- .1" HOLES = +/- .005



REV	DESCRIPTION	DATE	APPROVED
5	CSI-NEXT	11.03.19	M/D
6	SLOT-NOTCH MOD	11.06.15	M/D
7	WELD COMPENSATION	11.07.27	M/D
8	OPENED SLOT FOR VIBER SC	11.08.02	M/D
9	HANDLED L TO R; MOD FOR LARGER CYL	11.08.29	M/D
10	LOWERED ST POINT	11.11.30	M/D



1364 N. McDDOWELL BLVD.
P.O.BOX 750236
PETALUMA, CA 94975
707 765 0982

CASTLE PART NO.	M55407	CSI
DRAWING NO.		
CG.250ssBASE.10		
DRAWN AND	DATE 11.11.30	E-1

UNLESS OTHERWISE SPECIFIED:

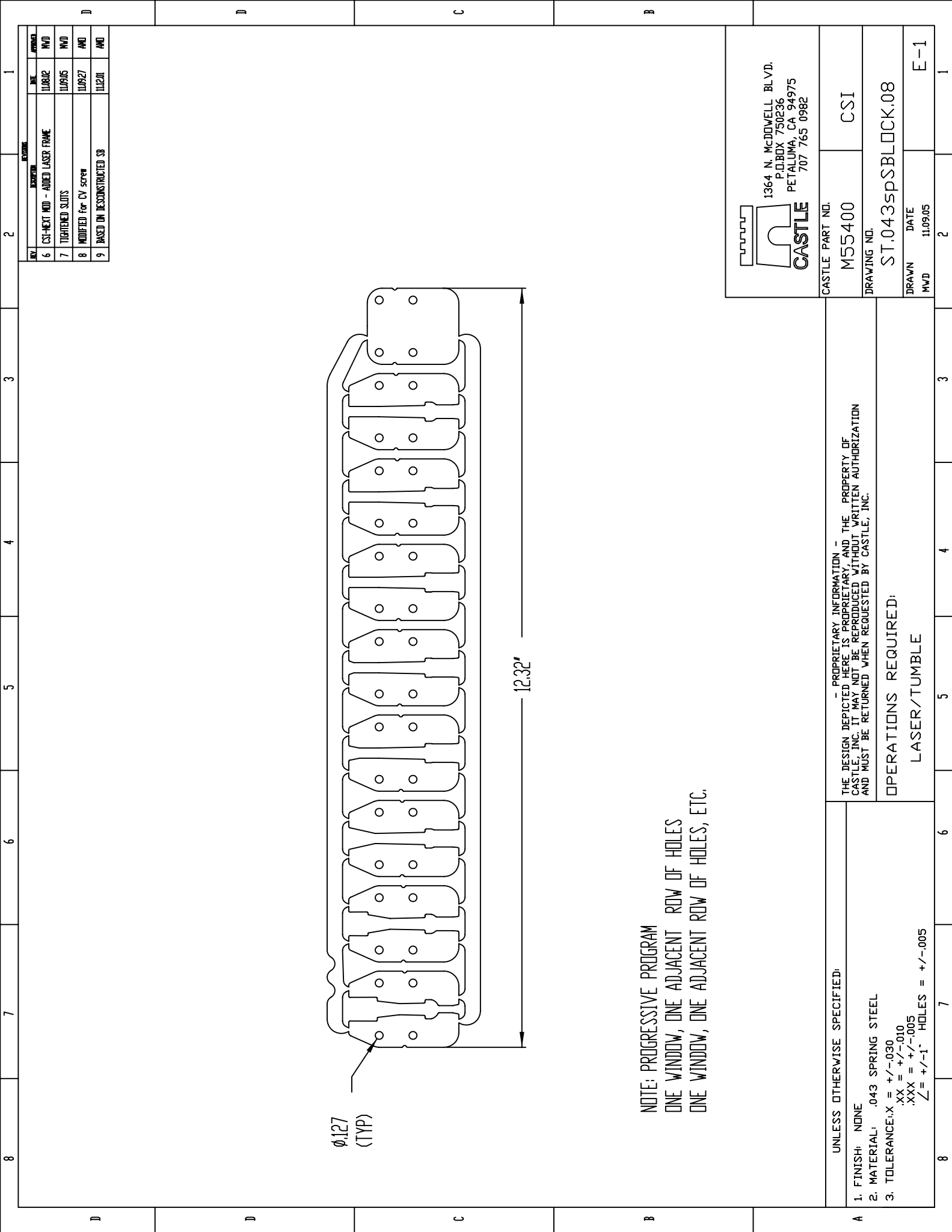
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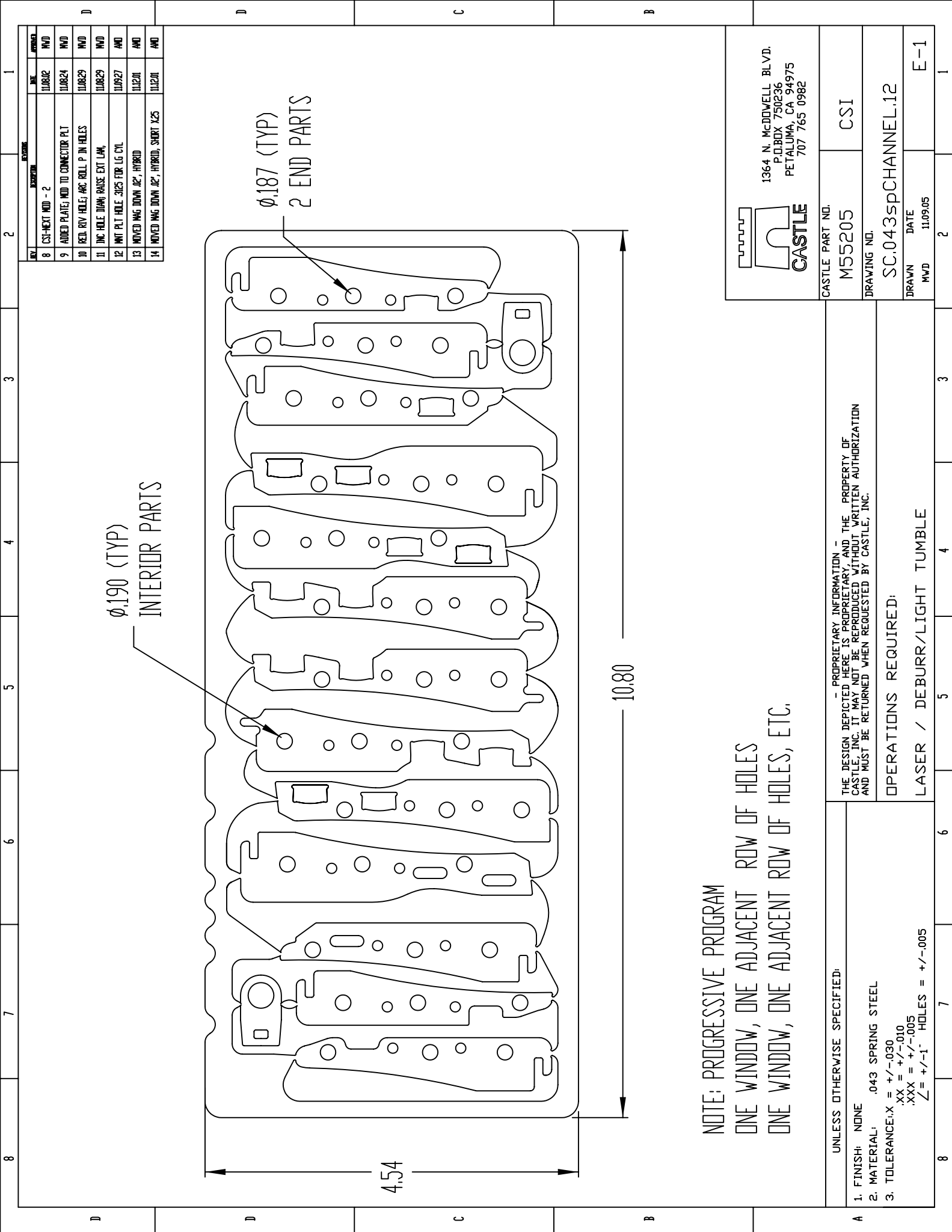
2. MATERIAL: .25 STAINLESS STEEL

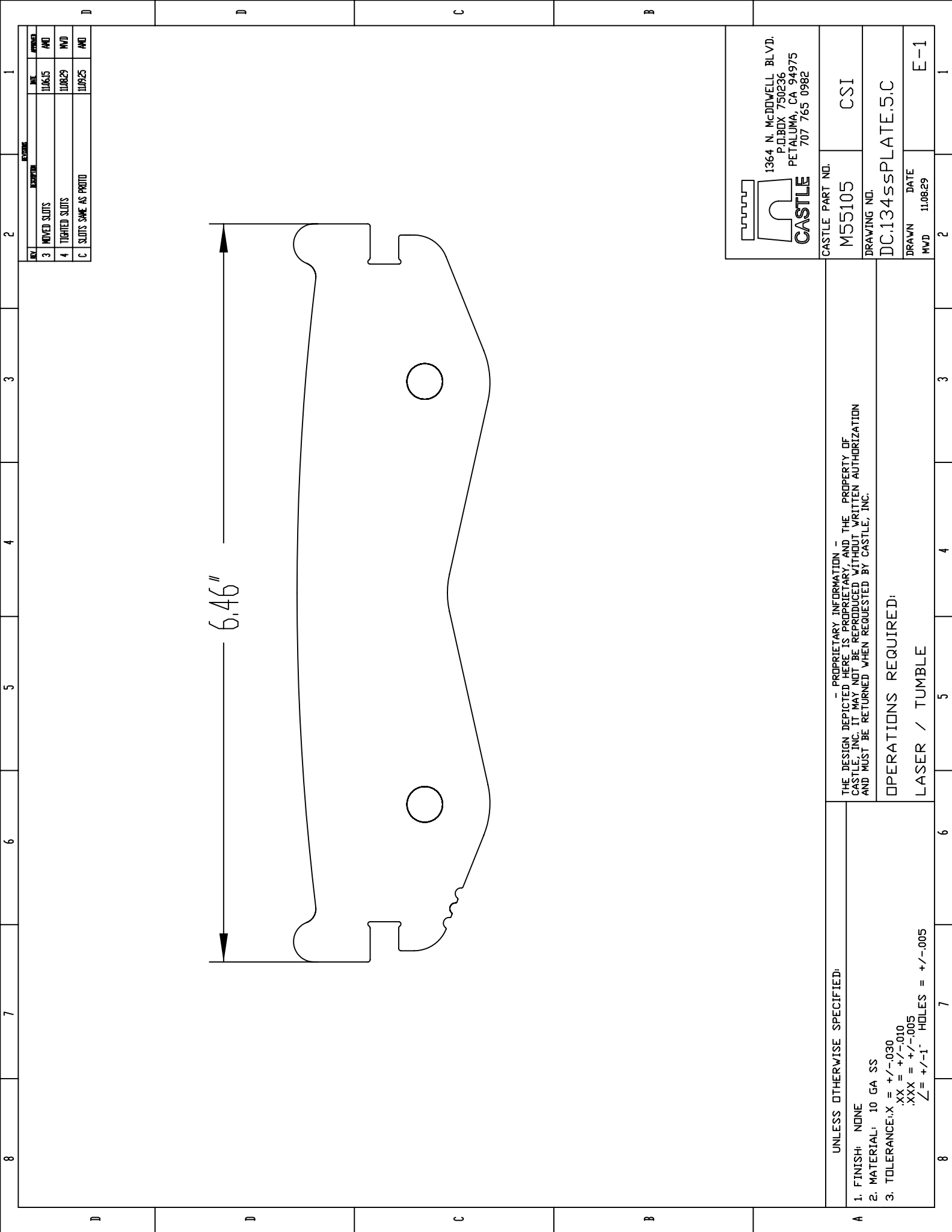
3. TOLERANCE: X = +/- .030
XX = +/- .010
XXX = +/- .005
Z = +/- .1" HOLES = +/- .005

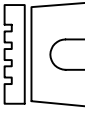
- PROPRIETARY INFORMATION -
THE DESIGN DEPICTED HERE IS PROPRIETARY, AND THE PROPERTY OF
CASTLE, INC. IT MAY NOT BE REPRODUCED WITHOUT WRITTEN AUTHORIZATION
AND MUST BE RETURNED WHEN REQUESTED BY CASTLE, INC.

OPERATIONS REQUIRED:
LASER / TUMBLE









1364 N. McDDOWELL BLVD.
P.O.BOX 750236
PETALUMA, CA 94975
707 765 0982

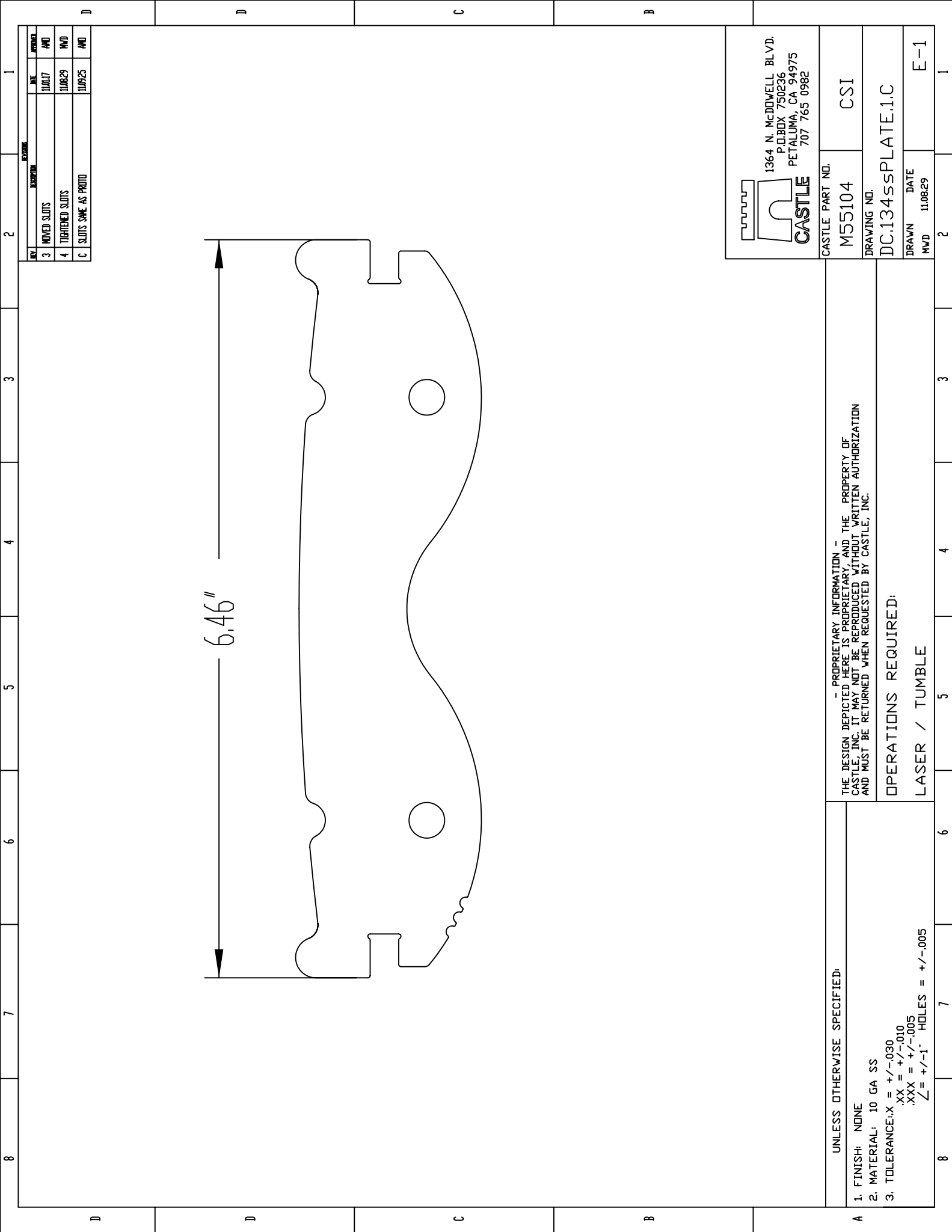
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DRAWING NO.	
DC.13455PLATE.5.C	
DRAWN	DATE
MVD	11/08/29
E-1	

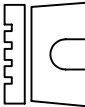
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OPERATIONS REQUIRED:
LASER / TUMBLE

UNLESS OTHERWISE SPECIFIED:

- 1. FINISH: NONE
- 2. MATERIAL: 10 GA SS
- 3. TOLERANCE: X = +/- .030
XX = +/- .010
XXX = +/- .005
Z = +/- .1" HOLES = +/- .005





1364 N. McDDIVELL BLVD.
P.O.BOX 750236
PETALUMA, CA 94975
707 765 0982

CASTLE PART NO.
M55104

DRAWING NO.
DC.134ssPLATE.1.C

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OPERATIONS REQUIRED:
LASER / TUMBLE

UNLESS OTHERWISE SPECIFIED:

1. FINISH: NONE

2. MATERIAL: 10 GA SS

3. TOLERANCE: X = +/- .030
XX = +/- .010
XXX = +/- .005
Z = +/- .1" HOLES = +/- .005

CASTLE

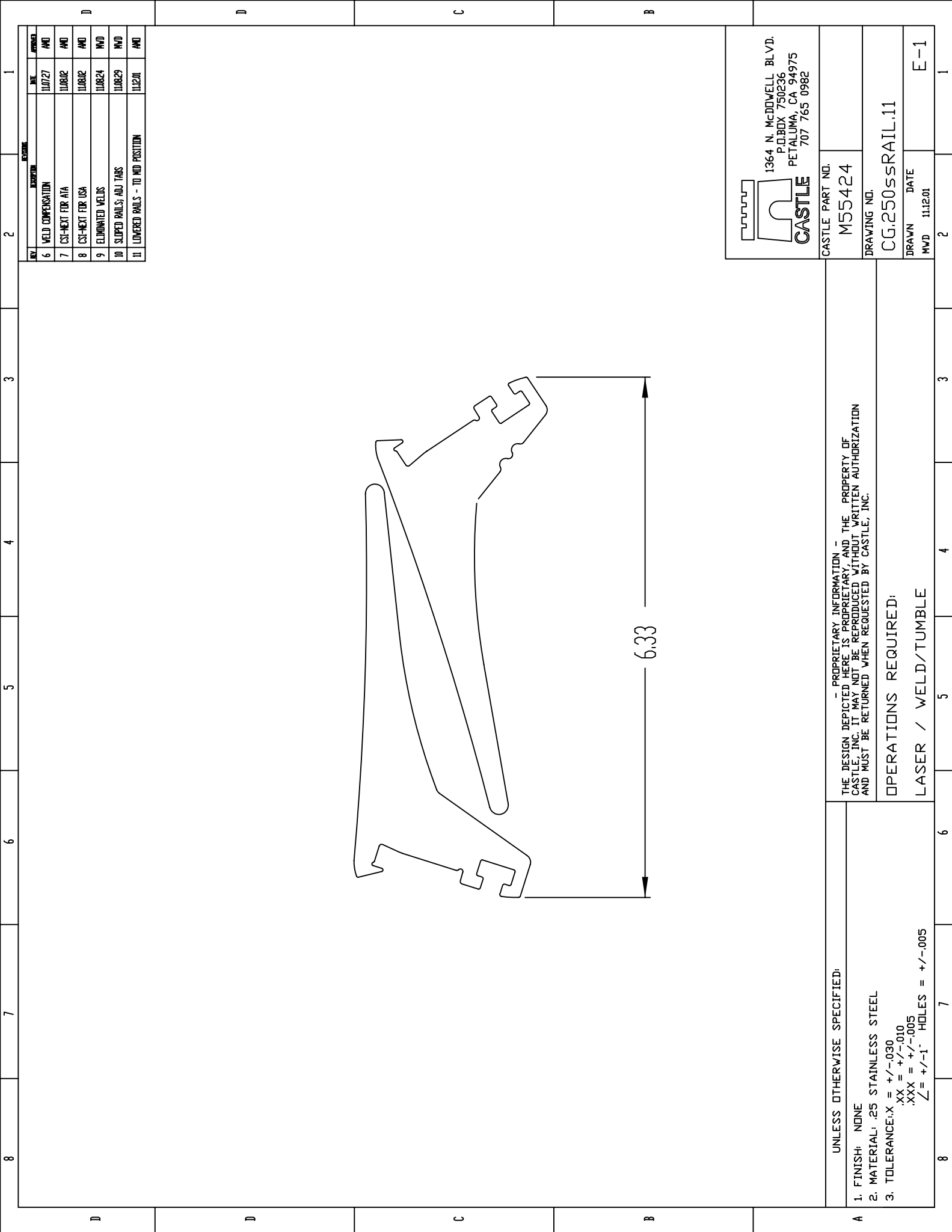
CASTLE PART NO.
M55104

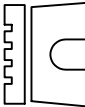
DRAWING NO.
DC.134ssPLATE.1.C

DRAWN
MJD

DATE
11/08/29

E-1





1364 N. McDDIVELL BLVD.
P.O.BOX 750236
PETALUMA, CA 94975
707 765 0982

CASTLE

CASTLE PART NO.
M55424

DRAWING NO.
CG.250ssRAIL.11

DRAWN
MVD

DATE
11.12.01

E-1

2

1

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CASTLE, INC. IT MAY NOT BE REPRODUCED WITHOUT WRITTEN AUTHORIZATION
AND MUST BE RETURNED WHEN REQUESTED BY CASTLE, INC.

OPERATIONS REQUIRED:
LASER / WELD/TUMBLE

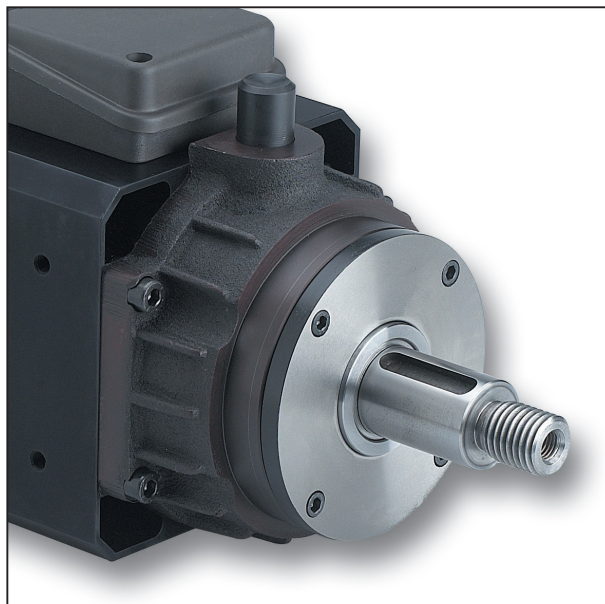
- UNLESS OTHERWISE SPECIFIED:
1. FINISH: NONE
 2. MATERIAL: .25 STAINLESS STEEL
 3. TOLERANCE: X = +/--.030
XX = +/--.010
XXX = +/--.005
Z = +/--.1" HOLES = +/--.005

MANUALE ISTRUZIONI

INSTRUCTION MANUAL

**Elettromandrino
di precisione
Alta Velocità
Serie RV**

***High-speed
Electric Spindle
RV Serie***



**Elettromandrino tipo - *Spindle*
Type**

RV73/2FP1CPE25DX

DATI DI TARGA - NAME PLATE DATA

Voltaggio - <i>Voltage</i>	V	220/380	220/380
Frequenza - <i>Frequency</i>	Hz	300-400	300-400
Velocità - <i>Speed</i>	rpm	18000-24000	18000-24000
Potenza - <i>Power</i>	kW	2,2	2,2
A - A	A	8,6/5	8,6/5
Poli - <i>Poles</i>	n.	2	
Matricola - <i>Serial</i>	n.		



ELETTROMECCANICA GIORDANO COLOMBO S.r.l.

Via Rivera 53 - 20048 - CARATE BRIANZA (MI)

Tel. +39 (0)362 90 42 82 - Fax +39 (0)362 99 08 17

Web Site : www.elettromeccanicagcolombo.com

E-Mail : commerciale@elettromeccanicagcolombo.com

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Scopo del manuale

Il presente manuale contiene le caratteristiche tecniche, le prestazioni, le norme di trasporto ed installazione, le istruzioni d'uso e le operazioni di manutenzione preventiva e correttiva dell'Elettromandrino prodotta dalla Società **ELETTROMECCANICA GIORDANO COLOMBO S.r.l.**

NOTA : Il presente manuale deve essere considerato una parte integrante dell'Elettromandrino e deve rimanere con essa per tutta la durata della vita dell'impianto.

Conservare il presente manuale e tutta la documentazione allegata in un luogo accessibile a tutto il personale preposto alla conduzione o alla manutenzione dell'Elettromandrino.

La Società **ELETTROMECCANICA GIORDANO COLOMBO S.r.l.** si riserva il diritto di subordinare la fornitura di ulteriori copie alla rifusione degli oneri ed alla accettazione di clausole particolari in relazione alla legittima difesa dei diritti di proprietà ideologica, brevettuale e di identità esecutiva e funzionale del prodotto e/o di parti di esso. Resta inteso che non è ammessa, se non a seguito di una specifica approvazione scritta della **ELETTROMECCANICA GIORDANO COLOMBO S.r.l.**, la trasmissione a terzi di tutto o parte del presente manuale d'uso, sia per quanto riguarda il testo che le illustrazioni e gli schemi allegati. La Società **ELETTROMECCANICA GIORDANO COLOMBO S.r.l.** si riserva il diritto di apportare modifiche senza preavviso.

Qualsiasi modifica, integrazione o soppressione di elementi, componenti, funzioni o cicli dell'Elettromandrino, non previamente concordata con la Società **ELETTROMECCANICA GIORDANO COLOMBO S.r.l.** solleva il costruttore da ogni responsabilità.

Il presente manuale è dedicato all'utilizzatore ed al manutentore dell'Elettromandrino con lo scopo di fornire loro i principali dati tecnici caratteristici del sistema, una descrizione tecnica dei vari gruppi funzionali che lo compongono, nonché le principali procedure di uso e le informazioni necessarie per effettuare gli interventi di manutenzione preventiva e correttiva.

*The nstructions includes information on technical data, performances, transport and installation, instructions for use and preventive and corrective maintenance relative to the Electrospindle produced by the Company **ELETTROMECCANICA GIORDANO COLOMBO S.r.l.***

*NOTE : The instructions are an integral part of the Electro-spindle and must be kept with it for the whole duration of the equipment's life. The instructions and any attached documentas must be kept in a place accessible to all personnel in charge of the operation or the maintenance of the Electro-spindle. The Company **ELETTROMECCANICA GIORDANO COLOMBO S.r.l.** reserves itself the right to supply further copies subject to the refunding of costs and the acceptance of special clauses relative to the protection of ideological property, patent and executive and functional identity of the product and/or any part thereof. It is understood that, unless specific written approval is given by **ELETTROMECCANICA GIORDANO COLOMBO S.r.l.**, the transmission to any third party of these instructions, either in whole or in part, both as far as the text and the figures and diagrams are concerned, is prohibited. The Company **ELETTROMECCANICA GIORDANO COLOMBO S.r.l.** reserves itself-500 the right to make any change without any notice.*

*Any change, integration or elimination of elements, components, functions or cycles of the Electro-spindle which has not been previously agreed with the Company **ELETTROMECCANICA GIORDANO COLOMBO S.r.l.** automatically releases the manufacturer from any liability.*

The instructions are intended for those in charge of the use and maintenance of the Electro-spindle and aims at supplying the main technical data of the system, a technical description of its various functional components, as well as the main procedures for its use and any information necessary for any intervention of preventive and corrective maintenance.

Il manuale è rivolto a personale che abbia maturato una buona conoscenza della tecnica di lavorazione, del disegno meccanico ed elettrico e coinvolge sia gli addetti alla conduzione che i tecnici preposti all'assistenza tecnica.

Il presente manuale costituisce parte integrante dell'Elettromandrino e contiene informazioni per far sì che tutto il personale che la utilizza possa operare in sicurezza e garantire una perfetta efficienza per tutto il periodo di vita dell'Elettromandrino.

Per un corretto uso della macchina si presuppone che l'ambiente di lavoro sia adeguato alle correnti normative in fatto di sicurezza ed igiene.

Direttive e Norme tecniche applicate

L'Elettromandrino è stato progettato, realizzato e collaudato conformemente ai "requisiti essenziali di sicurezza e di salute" richiamati dall'allegato I della **Direttiva europea 98/37/CE**.

Nell'elenco seguente sono riportate le Norme utilizzate come riferimento da **ELETTROMECCANICA GIORDANO COLOMBO S.r.l.** per la progettazione, la realizzazione ed il collaudo dell'Elettromandrino e del presente Manuale Istruzioni.

DIRETTIVA MACCHINE 98/37/CE

ISO 7000/89 Segni grafici utilizzabili sulle apparecchiature

EN 10653 (Documentazione tecnica - Qualità della documentazione tecnica di prodotto)

EN 10893 (Documentazione tecnica di prodotto - Istruzioni per l'uso)

CEI EN 62079/2002 Preparazione di Istruzioni - Struttura, contenuto e presentazione.

Direttiva Macchine

Si definisce Direttiva Macchine la DIRETTIVA DEL CONSIGLIO DELLE COMUNITA' EUROPEE 89/392/CEE del 14 giugno 1989 e le successive direttive che ne modificano il contenuto rispettivamente 91/368/CEE del 20 Giugno 1991, 93/44/CEE del 14 Giugno 1993 e 93/68/CEE del 22 Luglio 1993.

Nel giugno 1998 la Direttiva Macchine ed i suoi successivi emendamenti sono stati raccolti nella Direttiva 98/37/CEE senza apportarvi modifiche.

The instructions aimed at personnel who has a good knowledge of processing techniques, mechanical and electrical drawing and concerns both those in charge of operating the system and the engineers in charge of technical assistance.

The instructions are an integral part of the Electro spindle and includes information aimed at allowing personnel to operate the system safely and at guaranteeing a perfect efficiency throughout the Electro-spindle's life.

For its correct operation, the machine should be used in a work environment in conformity with the safety and health regulations in force.

Applicable Directives and Regulations

*The Electro-spindle was developed, created and tested according to the "essential Safety and health requirements", stated in the enclosure I of the **European directive 98/37/EC**.*

*The following list includes those Regulations referred to by **ELETTROMECCANICA GIORDANO COLOMBO S.r.l.** for the development, the creation and the testing of the Electro-spindle and of this Manual of Instructions.*

MACHINERY DIRECTIVE 98/37/EC

ISO 7000/89 Graphic symbols which can be used on machinery

EN 10653 (Technical documentation - Quality of a product's technical documentation)

EN 10893 (Product's technical documentation Instructions for use)

CEI EN 62079/2002 Preparation of Instructions - Format, contents and presentation.

Machinery Directive

*By Machinery Directive is meant the **DIRECTIVE OF THE COUNCIL OF THE EUROPEAN COMMUNITY 89/392/EEC** of 14th June 1989 and any subsequent modification, respectively 91/368/EEC of 20th June 1991, 93/44/EEC of 14th June 1993 and 93/68/EEC of 22nd July 1993.*

In June 1998 the Machinery Directive and its subsequent amendments have been gathered under Directive 98/37/EEC without any further modification.

Il manuale di istruzioni deve essere letto nella sua interezza e da personale qualificato prima di procedere all'installazione dell'elettroman-drino sulla macchina.

Disegni quotati e fotografie sono forniti da **ELETTROMECCANICA GIORDANO COLOMBO S.r.l.** a mero titolo esemplificativo, al fine di consentire una più facile comprensione del testo.

ELETTROMECCANICA GIORDANO COLOMBO S.r.l., nel perseguire una politica di costante sviluppo e aggiornamento, si riserva il diritto di apportare modifiche tanto funzionali quanto estetiche al proprio prodotto, di effettuare variazioni nel disegno di componenti funzionali ed accessori, nonché di sospendere la produzione e la fornitura di prodotti, ricambi ed accessori, senza alcun dovere di informazione e senza incorrere in obbligazione alcuna.

Eventuali errori e discrepanze delle procedure descritte in questo manuale dalle normative vigenti in campo di sicurezza dovranno essere tempestivamente segnalate al nostro ufficio tecnico che provvederà ad eventuali correzioni e adattamenti.

In nessun caso le informazioni e le operazioni descritte in questo manuale si sostituiscono alle norme sulla sicurezza vigenti.

L'uso del presente manuale avviene sotto la completa responsabilità da parte dell'utente.

Al termine della consultazione conservare il manuale in modo tale da averlo sempre a portata di mano.

The instructions must be read in its entirety by qualified personnel before the installation of the Electro-spindle on a machine.

*Drawings and photographs are supplied by **ELETTROMECCANICA GIORDANO COLOMBO S.r.l.** purely by way of illustration, and as an aid for an easier understanding of the text.*

ELETTROMECCANICA GIORDANO COLOMBO S.r.l., in its pursuance of a policy of constant development and update, reserves itself the right to make any functional or aesthetic modification to its product, to vary the design of functional components and accessories and to suspend the manufacture and supply of products, spare parts and accessories without notice and without incurring any obligation whatsoever.

Any error or discrepancy of the procedures described in this manual from the safety regulations in force must be immediately reported to our engineering department, which will take measures to carry out any necessary correction or adjustment.

Under no circumstances do the information and the operations described in this manual substitute the safety regulations in force.

The use of these instructions is carried out under the user's exclusive responsibility.

The manual must be kept in such a place as to be always readily available.

Simbologia nel manuale

Nel presente manuale vengono utilizzati alcuni simboli per richiamare l'attenzione del lettore e sottolineare alcuni aspetti particolarmente importanti della trattazione.

La seguente tabella riporta l'elenco e descrive il significato dei diversi simboli utilizzati.

SIMBOLO SIGNIFICATO e NOTE



Pericolo

Indica un pericolo con rischio di infortunio, anche mortale, per l'utilizzatore. Prestare la massima attenzione ai blocchi di testo indicati da questo simbolo.



Obbligo

Questo simbolo indica al lettore che per effettuare interventi sull'Elettromandrino deve togliere la corrente di alimentazione.



Attenzione

Avvertenza - Nota

Indica un'avvertenza o una nota su funzioni chiave o su informazioni utili.



Rischio di danneggiamento

Indicazione relativa ad un forte rischio di danneggiamento di un pezzo, per esempio utilizzando un utensile sbagliato o eseguendo un montaggio secondo una procedura errata.



Rilevamento visivo

Indica al lettore che deve procedere ad un rilevamento visivo. Questo simbolo si può incontrare anche nelle istruzioni d'impiego. Si richiede all'utilizzatore di leggere un valore di misura, di controllare una segnalazione, ecc..



Rilevamento uditivo

Indica al lettore che deve procedere ad un rilevamento uditivo. Questo simbolo si può incontrare anche nelle istruzioni d'impiego. Si richiede all'utilizzatore di ascoltare un rumore di funzionamento.

Operating instructions symbols

Some symbols used in these instructions have the purpose of drawing the reader's attention to and highlighting some particularly important aspects.

The following table lists and describes the various symbols used throughout the manual.

SYMBOL MEANING and NOTES



Danger

It refers to a danger implying a risk of injury, even lethal, for the user. Maximum attention should be paid to the text where this symbol appears.



Obligation

This symbol tells the reader that, in order to carry out any intervention on the Electro-spindle, the power must be switched off.



Warning

Warning - Note

It refers to a warning or a note on key functions or useful information.



Risk of damage

It refers to a high risk of damage to a part, for example as a consequence of using the wrong tool or following the wrong assembly procedure.



Visual survey

It informs that the reader must carry out a visual survey. This symbol can also appear on the instructions of use. The reader is asked to read a measure, to check a signal, etc.



Auditory survey

It informs that the reader must carry out an auditory survey. This symbol can also appear on the instructions of use. The reader is asked to listen to an operating noise.

Note generali alla consegna

Al ricevimento dell'Elettromandrino controllare che:

La fornitura corrisponda alle specifiche dell'ordine.

Non vi siano danni dovuti al trasporto o altro.

(In caso di danni o pezzi mancanti informare immediatamente e in modo dettagliato lo spedizioniere o la **ELETTROMECCANICA GIORDANO COLOMBO S.r.l.**).

PER QUALSIASI RICHIESTA ALLA ELETTROMECCANICA GIORDANO COLOMBO S.r.l. O AI SUOI CENTRI DI ASSISTENZA, CITARE SEMPRE IL NUMERO DI MATRICOLA DELL'ELETTROMANDRINO.

Collaudo

L'Elettromandrino è collaudato direttamente dal costruttore durante le fasi di produzione in conformità al sistema qualità aziendale. Insieme all'Elettromandrino viene fornito l'Attestato di Conformità del prodotto. La **ELETTROMECCANICA GIORDANO COLOMBO S.r.l.** si ritiene responsabile della macchina nella sua configurazione originale. La **ELETTROMECCANICA GIORDANO COLOMBO S.r.l.** declina ogni responsabilità per uso improprio dell'Elettromandrino, per danni causati in seguito ad operazioni non contemplate in questo manuale o irragionevoli.

Prescrizioni di sicurezza

L'utente finale deve adempiere alle indicazioni impartite dalla Venditrice in tema di:

- prescrizioni per la corretta installazione dell'Elettromandrino
- corretto uso e periodica manutenzione di tutti i componenti dell'Elettromandrino

General delivery notes

Upon receipt of the Electro-spindle, please check that:

The goods supplied correspond to those ordered. No damages have occurred during transport or other.

*(In the event of damages or missing parts, the shipping agent or **ELETTROMECCANICA GIORDANO COLOMBO S.r.l.** must be immediately informed in detail.*

ALWAYS QUOTE THE SERIAL NUMBER OF THE ELECTRO-SPINDLE IN ANY REQUEST TO ELETTROMECCANICA GIORDANO COLOMBO S.r.l. OR TO ITS CUSTOMER SERVICE CENTRES.

Testing

The Electro-spindle is tested by the manufacturer throughout the production stages, in conformity with the company's quality system.

The Electro-spindle is supplied with a Certificate of Conformity of the product.

ELETTROMECCANICA GIORDANO COLOMBO S.r.l. is liable for the machine in its original configuration.

ELETTROMECCANICA GIORDANO COLOMBO S.r.l. accepts no responsibility for any incorrect use of the Electro-spindle, for damages arising from any operation which has not been provided for in this manual or for unreasonable damages.

Safety prescriptions

The end user must observe the directions provided for by the Supplier, namely:

- prescriptions for a correct installation of the Electro-spindle
- correct use and regular maintenance of all components of the Electro-spindle

Definizione d'uso ed avvertenze generali

Gli elettromandri progettati da **ELETTROMECCANICA G.COLOMBO** sono studiati per essere incorporati ad una macchina utensile o robot per asportazione di materiale su cui la ditta committente provvederà ad eseguire i necessari interventi per renderla conforme alla Direttiva 98/37 CE.

L'elettromandrino non può essere messo in servizio prima che la macchina nella quale sarà incorporato sia resa conforme alle disposizioni della Direttiva 98/37 CE.

Utilizzare l'elettromandrino solo per lavorare i materiali specificati dal committente in fase di ordinazione.

In fase di certificazione del prodotto tutte le parti in moto rotatorio di sono equilibrate dinamicamente secondo normativa **ISO1940/1**.

Descrizione dei Pittogrammi

Sull'Elettromandrino sono applicati i pittogrammi per indicare situazioni di Pericolo

Molti incidenti sono spesso causati dall'inosservanza delle più elementari norme di sicurezza o dalla scarsa conoscenza delle istruzioni fornite dal costruttore.

Al fine di prevenire possibili situazioni di pericolo si è provveduto a ricordare alcune di esse tramite dei particolari segnali rappresentati da simboli appropriati e normalizzati (pittogrammi).

Di seguito se ne elencano alcuni tra i più comuni applicati sugli Elettromandri :



Attenzione !
Rischio di shock di natura elettrica.

Definition of use and general instructions

*The Electro-spindles designed by **ELETTROMECCANICA GIORDANO COLOMBO S.r.l.** have been devised to be mounted on a machine tool or a robot for the removal of material; it is the customer's responsibility to have any necessary interventions carried out on said machinery in order to render it compliant with Directive 98/37 EC.*

The Electro-spindle can only be used if the machine on which it is going to be mounted has been rendered compliant with Directive 98/37 EC.

The Electro-spindle can only be used to work the materials specified by the customer at the moment of ordering.

*At the moment of certification, all the product's rotating parts are dynamically balanced according to regulation **ISO1940/1**.*

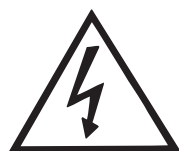
Description of Pictograms

Pictograms are applied on the Electro-spindle to denote Danger situations

Many accidents are often caused by the failure to observe the most elementary safety regulations or by the lack of knowledge of the instructions supplied by the manufacturer.

To prevent the occurrence of situations of danger, these are represented by means of special pertinent and standard symbols (pictograms).

Here follows a list of the most common pictograms applied on Electro-spindles :



Caution !
Risk of electric shock.

Condizioni di garanzia

ELETTROMECCANICA GIORDANO COLOMBO S.r.l. garantisce che l'elettromandrino è stato collaudato presso il proprio stabilimento con esito positivo e che lo stesso è esente da vizi di fabbricazione e da difetti di materiale e/o di lavorazione.

ELETTROMECCANICA GIORDANO COLOMBO S.r.l. offre una garanzia di dodici mesi per difetto di fabbricazione, decorrente dalla data di consegna dell'elettromandrino all'acquirente.

Durante il periodo di garanzia, accertata la sussistenza di un difetto di fabbricazione, **ELETTROMECCANICA GIORDANO COLOMBO S.r.l.** si impegna, a proprie ed esclusive spese, a provvedere alla tempestiva rimozione del difetto lamentato, attraverso la riparazione e/o la sostituzione dei componenti e delle parti eventualmente riscontrati difettosi.

Spese di trasporto e/o spedizione restano a carico esclusivo del cliente.

Non sono coperti da garanzia i difetti riconducibili a componenti e parti che, per loro natura, sono soggetti a rapida e continua usura, quali cuscinetti, guarnizioni, cinghie ecc..

Più specificamente, **ELETTROMECCANICA GIORDANO COLOMBO S.r.l.** non offre garanzia alcuna per la durata dei cuscinetti, dipendendo questa da molteplici fattori quali il tipo di lavorazione eseguito, il grado di equilibratura degli utensili utilizzati, nonché eventuali urti e/o sollecitazioni meccaniche subiti, superiori ai limiti di valore indicati dal costruttore.

ELETTROMECCANICA GIORDANO COLOMBO S.r.l. non risponde dei difetti di conformità dell'elettromandrino cagionati dalla mancata osservanza delle norme previste dal manuale di istruzioni e, in generale, da cattivo uso, manutenzione e/o trattamento dell'elettromandrino.

Ne consegue che l'acquirente decade dalla garanzia qualora il difetto lamentato sia riconducibile a manomissione, ovvero a montaggio di ricambi non originali.

ELETTROMECCANICA GIORDANO COLOMBO S.r.l. e/o a sostituzioni di componenti non previste e/o non autorizzate dal presente manuale e in ogni caso di sostituzioni e/o riparazioni effettuate dallo stesso acquirente o da terzi, senza il preventivo consenso scritto di **ELETTROMECCANICA GIORDANO COLOMBO S.r.l.**

In nessun caso **ELETTROMECCANICA GIORDANO COLOMBO S.r.l.** o i suoi fornitori assumono responsabilità per i danni che possono derivare dall'uso dei propri prodotti, inclusi, senza limitazione, il danno all'integrità fisica, il danno emergente e il lucro cessante, il danno per interruzione di attività, perdita di informazioni e qualsivoglia ulteriore danno economico.

Terms and conditions of guarantee

ELETTROMECCANICA GIORDANO COLOMBO S.r.l. hereby guarantees that the electro-spindle was successfully tested at its factory and that it does not have any manufacturing, material and/or processing defects.

ELETTROMECCANICA GIORDANO COLOMBO S.r.l. hereby offers a twelve-months guarantee for manufacturing defects, starting from the date of delivery of the electro-spindle to the purchaser.

If during the period of guarantee a manufacturing defect is found, **ELETTROMECCANICA GIORDANO COLOMBO S.r.l.** undertakes to remove said defect in due time by means of repair and/or substitution of any faulty component or part at its own cost.

Any transport and/or freight expense is payable by the client.

The guarantee does not cover any fault caused by those components or parts which, by their own nature, are subject to fast and continuous wear, such as bearings, washers, belts, etc.

Specifically, **ELETTROMECCANICA GIORDANO COLOMBO S.r.l.** does not offer any guarantee as far as the life of bearings is concerned, as this depends on many factors, such as the type of processing, the balancing of the tools used, as well as any shock and/or mechanical stress greater than the limits stated by the manufacturer.

ELETTROMECCANICA GIORDANO COLOMBO S.r.l. is not liable for any lack of conformity of the electro-spindle arising from the non-observance of the regulations provided for by the manual of instruction and, in general, from bad use, maintenance and/or handling of the electro-spindle.

There follows that the purchaser cannot avail himself of the guarantee in the event that the fault which is the object of his complaint arises from any tampering, or use of non-original spare parts and/or substitutions of components which are not provided for and /or authorised by this manual and, in any event, any substitution and/or repair carried out by the purchaser himself or by a third party without the express written consent of **ELETTROMECCANICA GIORDANO COLOMBO S.r.l.**

Under no circumstance does **ELETTROMECCANICA GIORDANO COLOMBO S.r.l.** or its suppliers accept any responsibility with regards to damages which may arise from the use of its products including, without limitation, any physical damages, damages for missing profit and accruing damage, damages arising from interruption of activity, loss of information and any other economic damage.

Procedura per l'ottenimento della garanzia

L'acquirente è tenuto a denunciare a **ELETTROMECCANICA GIORDANO COLOMBO S.r.l.**, per iscritto e in modo puntuale e dettagliato, la natura di eventuali difetti di conformità riscontrati sull'elettromandrino, entro e non oltre 10 giorni dall'individuazione degli stessi.

Per riparazioni provenienti dall'Italia, l'acquirente è tenuto a provvedere alla spedizione franco destino del prodotto integro e adeguatamente imballato a :

C. G. SISTEMA S.n.c.

Via Rivera 53

20048 **CARATE BRIANZA** (MI)

allegando copia della richiesta di garanzia, corredata altresì dalla specifica descrizione della tipologia di lavorazione eseguita e, in generale, da tutte le informazioni necessarie per un'adeguata analisi del problema lamentato.

Per Resi provenienti dall'Italia o dall'Estero e per riparazioni provenienti dall'Estero, l'acquirente è tenuto a provvedere alla spedizione franco destino del prodotto integro e adeguatamente imballato a :

ELETTROMECCANICA

GIORDANO COLOMBO S.r.l.

Via Rivera 53

20048 **CARATE BRIANZA** (MI) - ITALIA

allegando copia della richiesta di garanzia, corredata altresì dalla specifica descrizione della tipologia di lavorazione eseguita e, in generale, da tutte le informazioni necessarie per un'adeguata analisi del problema lamentato.

La mancata denuncia nei modi e termini stabiliti comporta la decadenza dalla garanzia.

L'acquirente decade altresì dalla garanzia qualora non consenta a **ELETTROMECCANICA GIORDANO COLOMBO S.r.l.** di visionare il prodotto e/o di effettuare ogni analisi e controllo necessario o qualora, avendo **ELETTROMECCANICA GIORDANO COLOMBO S.r.l.** fatto richiesta di restituzione del pezzo assertivamente difettoso, l'acquirente ometta di restituirlo entro quindici giorni dalla richiesta.

Procedure for obtaining the guarantee

*The purchaser must send a report in writing to **ELETTROMECCANICA GIORDANO COLOMBO S.r.l.**, detailing the nature of any fault of conformity found in the electro-spindle within 10 days from the identification of said fault.*

For repairs within Italy, the purchaser must forward free of destination the entire product suitably packed to

C. G. SISTEMA S.n.c.,

Via Rivera 53,

20048 **CARATE BRIANZA** (MI),

free of carriage, enclosing a copy of the guarantee claim and a specific description of the type of processing carried out and, in general, any information supporting the identification of the problem found.

For returns from Italy or abroad and for repairs from abroad, the purchaser must forward free of destination the entire product suitably packed to

ELETTROMECCANICA

GIORDANO COLOMBO S.r.l.,

Via Rivera 53,

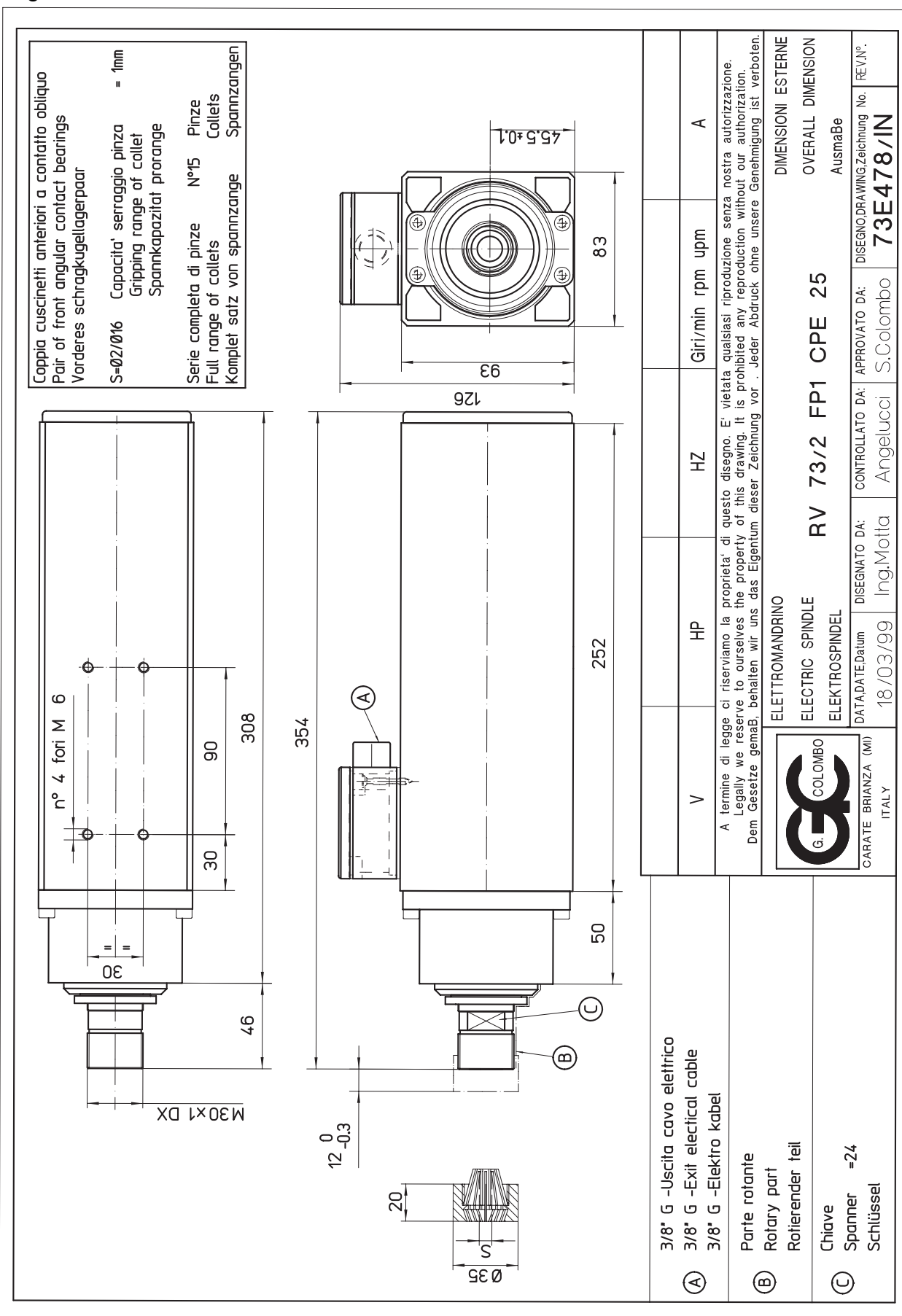
20048 **CARATE BRIANZA** (MI) - ITALY,

enclosing a copy of the guarantee claim and a specific description of the type of processing carried out and, in general, any information supporting the identification of the problem found.

Failure to observe the above procedure invalidates the guarantee.

*Furthermore, the guarantee is invalidated in the event that the purchaser does not allow **ELETTROMECCANICA GIORDANO COLOMBO S.r.l.** to view the product and/or carry out any analysis and inspection which may be deemed necessary or in the event that the purchaser does not return the part which is deemed to be faulty within fifteen days from **ELETTROMECCANICA GIORDANO COLOMBO S.r.l.** having requested the return of the part which is deemed to be faulty.*

Ingombri - Overall dimensions



Caratteristiche meccaniche

ATTACCO ALBERO : **CPE25 DX**

SISTEMA RITENUTA UTENSILE

Pinza ER25

Range di pinzaggio da 2 a 16 mm

TIPO CUSCINETTI

Anteriore

Coppia a contatto obliquo

Tipo SNFA VEX30/7CE1DDL

Posteriore

Singolo

Tipo 6202 ZTHB

LUBRIFICAZIONE CUSCINETTI

Grasso

Tipo Grasso:

KLUBER ISOFLEX TOPAS NB52

In alternativa:

LUBCON TURMOGREASE HIGHSPEED L252

SISTEMA DI TENUTA ANTERIORE

Non presente

EMISSIONE SONORA

Serie RV

max dbA = 80 (@24000 rpm)

PESO = 8,2 kg

Mechanical Specifications

TAPER : CPE25 DX

TOOL CLAMPING SYSTEM

Collet ER25

Clamping range from 2 to 16 mm

BEARINGS TYPE

Front

Angular contact bearings

Type SNFA VEX30/7CE1DDL

Rear

Single

Type 6202 ZTHB

BEARINGS LUBRIFICATION

Grease

Grease type:

KLUBER ISOFLEX TOPAS NB52

Or:

LUBCON TURMOGREASE HIGHSPEED L252

FRONT SEALING SYSTEM

Not present

NOISE STATEMENT

RV Series

max dbA = 80 (@24000rpm)

WEIGHT = 8,2 kg

Errore Statico di Eccentricità

MK III
MICRO-VERTEX

ELEY METROLOGY LTD
02/27200980

DITTA:
NOME:
DATA:
RIF.:

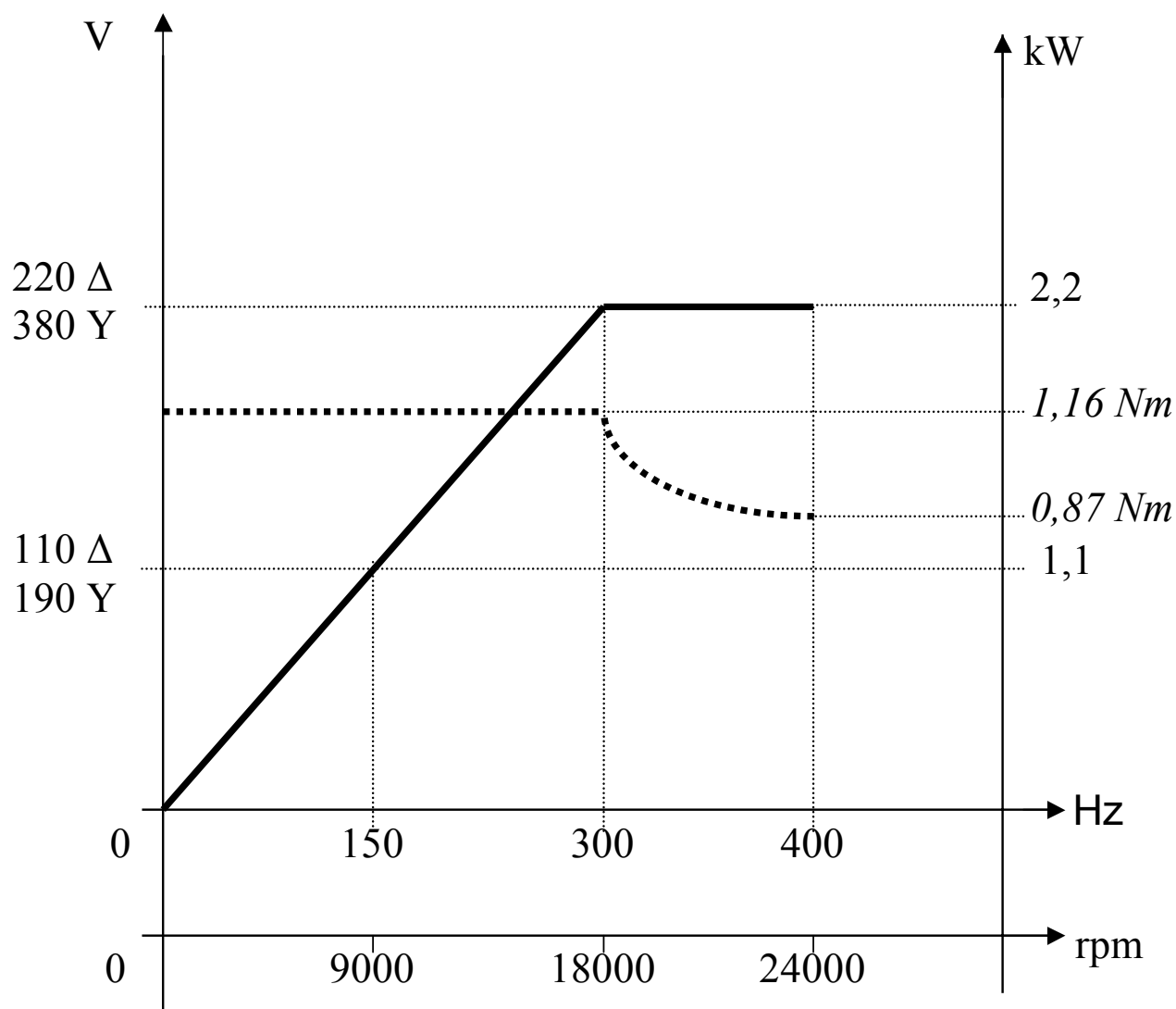
PUNTO
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Static Eccentricity Error

Specifiche elettriche - *Electrical specifications*

Diagramma coppia/potenza-velocità - *Power/Torque-speed diagram*



- Tipo servizio S1
- Classe di isolamento H

Sonda protezione termica:

- Interruzione = 130°C
- Ripristino = 50°C
- Alimentazione = 250V - 3A

- Service type S1
- Insulation class H

Thermal protection switch:

- Shut down = 130°C
- Recovery = 50°C
- Power = 250V - 3A

Sistema di raffreddamento

! Elettromandrino dotato di sistema di raffreddamento autonomo a ventola.

La ventola è calettata direttamente sulla parte posteriore dell'albero e provvede a raffreddare l'elettromandrino quando l'albero è in rotazione.

Non ostruire in nessun caso il passaggio dell'aria dai fori del coprimentola posteriore!

Fluido di Raffreddamento =
Aria ambiente

Cooling sistem

! *The electrical spindle is fitted with a self ventilation sistem.*

The fan is directly mounted on the bottom of the shaft and provide the necessary delivery of air for spindle cooling.

Don't cover the rear fan cover's holes!

Cooling Fluid Type =
Enviroment air

Imballo e trasporto

L'elettromandrino viene imballato e spedito in una scatola di cartone.

E' protetto da eventuali urti mediante l'utilizzo di polistirolo da imballaggio che viene interposto tra l'elettromandrino e le pareti della scatola.

Al momento della spedizione, l'elettromandrino è lubrificato in alcune sue parti per evitare la formazione di ruggine o ossidazioni del materiale.

Al momento dell'installazione portare l'imballo vicino alla macchina, rimuovere il materiale anti-urto al suo interno, ed estrarre l'elettromandrino.

ATTENZIONE

- ! L'operazione di sballaggio e posizionamento dell'elettromandrino sulla macchina può richiedere l'intervento di due o più persone e l'utilizzo di organi di movimentazione quali paranchi / gru etc...

Sollevamento

Uso dei Dispositivi di Protezione Individuale (DPI)

Per evitare infortuni agli arti inferiori dovuti alla caduta accidentale degli oggetti movimentati, è necessario fare uso delle scarpe antinfortunistiche se la valutazione del rischio ha individuato questa possibilità.

Allo stesso modo, per evitare contusioni e tagli alle mani, è necessario fare uso di guanti protettivi appropriati.

Caratteristiche del carico

Un carico è considerato troppo pesante per una sola persona quando :

- è superiore a 30 Kg per gli uomini adulti
- è superiore a 20 Kg per le donne adulte

Utilizzare per il sollevamento solo i fori e gli eventuali golfari (se predisposti) sull'elettromandrino per tale uso e indicati nell'eventuale schema di sollevamento.

ATTENZIONE

- ! Non forare nessuna parte dell'elettromandrino per inserire particolari necessari per la movimentazione.

Conditioning and transportation

The electrical spindle is packed and shipped in in a cardboard box.

It is protected against possible crashes with packing foam between the electrical spindle and the box walls.

When shipped, the electrical spindle is partially greased to avoid rust and material oxidation build-up.

Before the installation move the packaging next to the unit, remove the protection material and free the spindle.

ATTENTION

- ! *When removing the spindle from the packaging and positioning it onto the unit, two or more people are required as well as lifting hoists/cranes, etc.*

Lifting

Personal Protection Tool Use

As to avoid accidents to the lower limbs because of the accidental fall of lifted objects, it is necessary to wear protection shoes, if the risk is real.

At the same time, to avoid bruises and cuts to the hands, wear suitable protection gloves.

Load Features

The load is to be considered too heavy for a single person when:

- *it weighs for more than 30 Kg for men*
- *it weighs for more than 20 Kg for women*

Hoist the load from the holes and possible eyebolts if available on the electrical spindle and marked on

the hoisting diagram.

ATTENTION

- ! *Do not drill the electrical spindle to fit any hoisting tool.*

Immagazzinamento elettromandrino:

Se il prodotto deve essere conservato per un lungo periodo di tempo in magazzino, prima di essere installato, consigliamo di osservare le seguenti norme al fine di mantenere l'elettromandrino in perfetto stato di efficienza:

-Conservare l'elettromandrino, dovutamente imballato (consigliamo sempre di conservare i nostri prodotti nell'imballo originale) in un luogo asciutto all'interno dell'azienda, con un grado di umidità relativa non condensata di circa 5%-15% e in un range di temperatura da 5°C a 55°C.

-Controllare periodicamente lo stato di conservazione dell'imballo e dell'elettromandrino

-Controllare che l'imballo non abbia subito deterioramenti dovuti a urti o a intemperie

-Qualora l'elettromandrino debba essere installato dopo un'immagazzinamento superiore ai 6 mesi, seguire la procedura di riavvio descritta alla pagina 5.02

-Prima dell'installazione, dopo un lungo periodo di stoccaggio, oltre alla dovuta pulizia di tutto l'elettromandrino, si consiglia di ruotare a mano l'albero per alcuni giri affinché il grasso contenuto nelle piste dei cuscinetti abbia modo di distribuirsi uniformemente.

Stock procedure

If the product is conserved for a long period in stock, we suggest to observe the followings normes to keep the spindle in perfect working efficiency:

-Stock the spindle, carefully packed (we suggest to conserve the spindle in the GC original package) in a dry place in the company, having a relative humidity degree of 5%-15% and having a range of temperature from 5°C to 55°C.

-Periodical check of package and spindle conditions.

-Check if the package isn't damaged by the weather conditions or bumps.

-When you need to install the spindle after more than 6 months stock time, follow the warm up procedure decribed at page 5.02

-Before installation, after a long stock period, beyond the spindle complete cleaning, we suggest to rotate the shaft by hand, to permit the uniform distribution of bearing's grease.

Collegamento morsettiera - cavo

Terminal board-cable connection

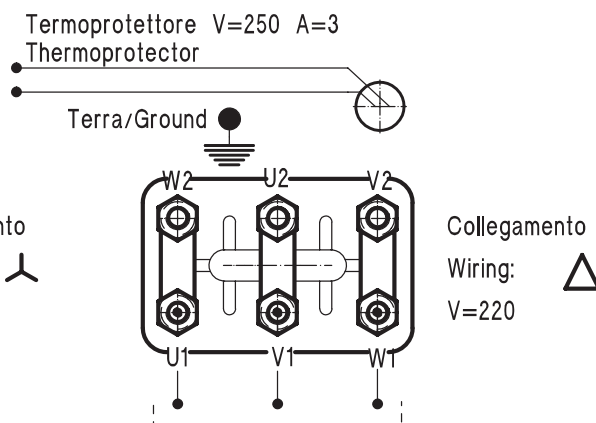
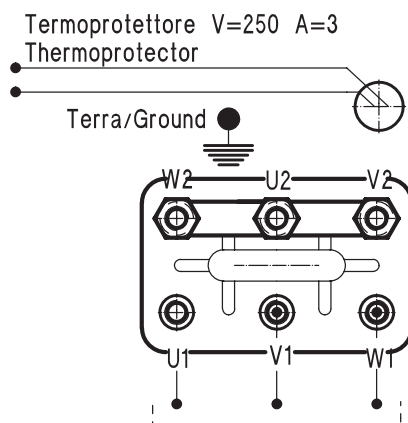
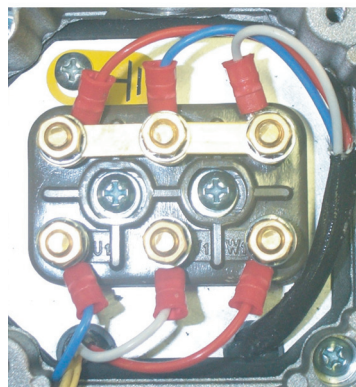
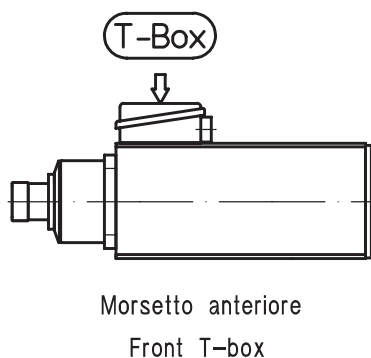


Tabella di riferimento collegamenti morsettiera (da statore)
Connections plate wiring reference (from stator)

Connessioni morsetto rif# Connections plate ref#	Colore cavo (dallo statore) Wire color (from stator)
U1	Blu-Blue
U2	Blu-Blue
V1	Bianco-White
V2	Bianco-White
W1	Rosso-Red
W2	Rosso-Red

Uso previsto e non previsto

Utilizzare l'Elettromandrino esclusivamente per la lavorazione del materiale specificato dal committente in fase di ordinazione onde evitare gravi inconvenienti.

ELETTROMECCANICA GIORDANO COLOMBO S.r.l. declina ogni responsabilità derivante dall'uso scorretto o improprio dell'Elettromandrino, dall'utilizzo di ricambi non prescritti e da manomissioni di circuiti e componenti.

La responsabilità dell'applicazione delle prescrizioni di sicurezza riportate nel seguito è a carico del personale tecnico responsabile delle attività previste della macchina, il quale deve accertarsi che il personale autorizzato sia qualificato a svolgere l'attività richiesta, sia a conoscenza e osservi scrupolosamente le prescrizioni contenute in questo documento e le norme di sicurezza di carattere generale applicabili.

La mancata osservanza delle norme di sicurezza può causare lesioni al personale e danneggiare componenti della macchina e dell'unità di controllo.

Condizioni ambientali

L'ambiente di lavoro è il normale ambiente di officina.

Naturalmente è bene che esso non presenti vapori corrosivi o sorgenti di calore eccessivo.

Consigli per il corretto uso degli utensili

Utilizzare solo utensili con diametri e pesi come da nostra tabella allegata

Gli utensili ed i portautensili devono essere equilibrati dinamicamente in G.1 e riequilibrati ad ogni affilatura o cambio di inserto.

Vibrazioni provocate da utensili non equilibrati possono danneggiare rapidamente i cuscinetti dell'elettromandrino.

Gli utensili devono essere sempre affilati per ridurre le forze di taglio e l'incremento delle temperature dovute alla lavorazione del materiale.

Il calore anomalo trasmesso da un utensile non affilato provoca una alterazione del grado di viscosità dei lubrificanti andando così a compromettere la durata delle parti interne del mandrino. Un calore eccessivo può inoltre causare dilatazione dei coni portautensili, rendendo così difficile lo sbloccaggio o la sostituzione degli utensili.

Forecast and non forecast use

Use the spindle only to machine any material the customer asks for in its order as to avoid any inconvenience whatsoever.

ELETTROMECCANICA GIORDANO COLOMBO S.r.l. is not liable for damages depending on the electrical spindle incorrect use, on the use of non original spare parts and on circuits and components tampering.

Any technical personnel is liable for the correct compliance with safety prescriptions. It is necessary to check that the liable personnel is qualified enough to carry out any operation on the spindle, is informed and carefully complies with prescriptions in the present document as well as with general applicable safety standards.

The lack of compliance with any safety standard can lead to accidents and damages to the spindle and control unit.

Environmental conditions

The unit is to normally used in a factory firm.

It is better to avoid any corrosive vapours or excessive heat sources.

Suggestions for the tools correct operation

Only use tools in diameters and weights as on the enclosed table.

Tools and tool holders are to be dynamically balanced in G.1 every insert change or sharpening.

Vibrations provoked by unbalanced tools can rapidly wear the electrical spindle bearings.

Tools are to be always sharp enough to avoid shear forces and temperature increases depending on the material to be machined.

Excessive heat transferred by an unsharpened tool can affect the lubricant viscosity thus damaging the spindle inside parts.

An excessive heat can lead to the tool holder cone dilation, thus making it difficult to remove and change to tools.

Procedura di riscaldamento

Una volta installato l'elettromandrino sulla macchina occorre seguire la procedura di avvio descritta nella tabella sottoriportata.

L'elettromandrino deve essere messo in funzione rispettando il senso di rotazione indicato. In mancanza di indicazioni specifiche l'elettromandrino può girare in entrambi i sensi di rotazione.

La procedura riportata nella tabella si riferisce all'avvio giornaliero della macchina e al riavvio ogni qualvolta l'elettromandrino si raffreddi fino a raggiungere la temperatura ambiente.

Il ciclo di preriscaldamento sottoriportato è da eseguire con portautensile inserito e senza eseguire lavorazioni.

L'inadempimento delle sopracitate indicazioni faranno decadere le nostre garanzie di fornitura.

Tabella riscaldamento elettromandrino

N.B.: I dati indicati in tabella sono relativi a **valori medi** di prove effettuate su diverse tipologie di elettromandrini.

Velocità di rotazione	Tempo singolo ciclo (min)
50% velocità max	5
75% velocità max	3
100% velocità max	3

Rodaggio da eseguire dopo lo stoccaggio (*) :

* - vedi pagina 3.01

Velocità di rotazione	Tempo singolo ciclo (min)
20 % velocità max	25
50% velocità max	10
75% velocità max	10
100% velocità max	15

Warm Up procedure

Once fit the spindle onto the unit, follow the start-up procedure on the enclosed table.

The electrical spindle should be started in compliance with the specified revolution directions.

Should no information be provided, the spindle can revolve in both directions.

The procedure described in the table refers to the unit daily operation and start-up any time the spindle cools down up to room temperature.

The described pre-heating cycle is to be carried out the tool holder fitted when not machining is started yet.

No compliance with the above-mentioned prescriptions cancels the guarantee.

Spindle Warm up table

Please note that data contained in the table below is referred to test average values provided on different spindles models.

Rotation speed	Single Cycle time (min)
50% max speed	5
75% max speed	3
100% max speed	3

WarmUp operation after stock period (*) :

* - See page 3.01

Rotation speed	Single Cycle time (min)
20% max speed	25
50% max speed	10
75% max speed	10
100% max speed	15

Dimensioni utensili consigliati - *Advised tool dimensions*

Grandezza cono <i>Taper size</i>	Stelo utensile <i>Tool stem</i> (Ø Max)	Velocità rotazione <i>Rotation Speed</i> (rpm)	Ø Utensile <i>Ø Tool</i> Max (mm)	Peso utensile <i>Tool holder</i> <i>Weight</i> Max (kg)
ER. 40 MK 4	30 mm	6000 - 9000	150	10
		9000 - 12000	130	7
		12000 - 15000	110	5
		15000 - 18000	80	5
ER. 32 MK 3	20 mm	6000 - 9000	140	4
		9000 - 12000	130	4
		12000 - 15000	110	2.5
		15000 - 18000	80	2.5
ER. 25 MK 2	16 mm	6000 - 9000	120	3
		9000 - 12000	90	2.5
		12000 - 15000	60	2
		15000 - 18000	30	1.5
ER. 20	13 mm	6000 - 9000	70	2.5
		9000 - 12000	50	2
		12000 - 15000	30	1.5
		15000 - 18000	20	1
ER. 16	10 mm	6000 - 9000	60	2.5
		9000 - 12000	40	2
		12000 - 15000	30	1.5
		15000 - 18000	20	1
ER. 11	07 mm	6000 - 9000	50	2.5
		9000 - 12000	30	2
		12000 - 15000	20	1.5
		15000 - 18000	10	1

Manutenzione periodica


Per mantenere l'elettromandrino in perfetta efficienza ed affidabile nel tempo è necessario provvedere ad una serie di controlli periodici sulle parti più sollecitate durante la lavorazione.

Attenendosi alle indicazioni e alla frequenza degli interventi riportati nella tabella sottostante si evita di incorrere in inconvenienti e guasti che richiedano la riparazione dell'elettromandrino da parte del nostro reparto con una conseguente perdita di tempo dovuto al fermo macchina.

Periodical service


As to keep the electrical spindle under good and reliable operating conditions in time, periodically check the most solicited parts during operation.

When complying with table intervention instructions and frequency it is possible to avoid failures or troubles asking for the electrical spindle repairing and the consequent unit downtime.

Controlli periodici - Periodic controls

Tipo di intervento <i>Control type</i>	Procedura di intervento	Intervention procedure	Frequenza di intervento <i>Operation frequency</i>
Pulizia esterna <i>External cleaning</i>	Usare un panno umido e dopo la pulizia asciugare immediatamente con panno asciutto.	<i>Use a wet cloth and after cleaning dry immediately with a dry cloth.</i>	Settimanale <i>Weekly</i>
Pulizia del cono portautensile <i>Toolholder cone cleaning</i>	Vedi allegato costruttore sistema di serraggio. Nel caso di lavorazioni in presenza di polveri è consigliata la pulizia del cono mandrino periodicamente con getti di aria compressa.	<i>See annexe</i> <i>Se clamping group manufacturer annexe.</i> <i>When working in the presence of dust it is necessary to periodically clean the inside taper of the electric spindle with jets of compressed air.</i>	Vedi allegato <i>See clamping</i>
Lubrificazione cuscinetti <i>Bearings lubrication</i>	Non necessita intervento	<i>None</i>	—

Tipo di intervento <i>Control type</i>	Procedura di intervento	Intervention procedure	Frequenza di intervento <i>Operation frequency</i>
Controllo cavi elettrici di potenza e cavi sensori <i>Power and sensor cables control</i>	Controllare che le guaine del cavo di potenza e dei sensori non presentino rotture	<i>Control that sensor and power cables are not broken or removed</i>	Settimanale <i>Weekly</i>
Controllo tubi dei circuiti pneumatici e idraulici <i>Pneumatic and hydraulic connection tubes control</i>	Controllare eventuali rotture dei tubi dell'aria e del circuito del liquido refrigerante e che i tubi siano alloggiati correttamente nei raccordi	<i>Control that pneumatic and hydraulic cables are not broken or removed</i>	Settimanale <i>Weekly</i>
Controllo sensori <i>Sensor control</i>	Controllare che i sensori siano correttamente posizionati nei rispettivi alloggiamenti e che viti e bicchierini per il fissaggio non siano allentati	<i>Control that sensor and their supports are correctly in their position and control that screws are correctly tightened</i>	Settimanale <i>Weekly</i>
Controllo e lubrificazione del sistema di serraggio <i>Clamping group control and lubrication</i>	Vedi allegato costruttore sistema di serraggio.	<i>See clamping group manufacturer annexe.</i>	Vedi allegato <i>See clamping</i>
Controllo viti fissaggio elettromandrino <i>Spindle fixing screws torque control</i>	Verificare la coppia di serraggio delle viti che fissano l'elettromandrino alla macchina	<i>Verify spindle fixing screw torque</i>	Mensile <i>Monthly</i>

Gli Elettromandri della Società **ELETTROMECCANICA GIORDANO COLOMBO S.r.l.** sono progettati e costruiti secondo criteri di robustezza, durata e flessibilità che consentono di utilizzarli per numerosi anni.

Una volta raggiunta la fine della sua vita tecnica e operativa, l'Elettromandrino deve essere demolito, ovvero messo fuori servizio e in condizioni di non essere comunque più utilizzato per gli scopi per cui a suo tempo era stato progettato e costruito, rendendo comunque possibile il riutilizzo delle materie prime che lo costituiscono.

NOTA

La Società **ELETTROMECCANICA GIORDANO COLOMBO S.r.l.** non si assume alcuna responsabilità per danni a persone o cose derivanti dal riutilizzo di singole parti dell'Elettromandrino per funzioni o situazioni differenti da quelle originali.

La Società **ELETTROMECCANICA GIORDANO COLOMBO S.r.l.** rifiuta qualsiasi riconoscimento, implicito o esplicito, di idoneità a scopi specifici di parti riutilizzate dopo la definitiva disattivazione dell'Elettromandrino in vista di una sua demolizione.

Per disattivare definitivamente l'Elettromandrino procedere nel seguente modo per separare le varie parti :

- Assicurarsi che la macchina sia arrestata e scollegata da qualsiasi linea elettrica idraulica pneumatica che possa provvedere al movimento imprevisto della macchina stessa o di una delle sue parti.
- Scollegare l'elettromandrino da tutte le sue utenze
- Separare le varie parti dell'Elettromandrino
- Dividere i materiali elettrici (avvolgimenti in rame) dai particolari metallici e plastici
- Smaltire in maniera differenziata, secondo le disposizioni di legge vigenti nel paese di installazione.

In caso di dubbi contattare il Servizio Assistenza della Società **ELETTROMECCANICA GIORDANO COLOMBO S.r.l.**

ATTENZIONE

- ! Le operazioni di disattivazione e demolizione dell'Elettromandrino devono essere affidate solo a personale adeguatamente addestrato ed equipaggiato.

ELETTROMECCANICA GIORDANO COLOMBO S.r.l. electrical spindles are designed and manufactured to be flexible and robust enough to last in time.

At the end of its technical and operating life, the electrical spindle is to be disposed as not to be used any longer, but possibly recycling its raw materials.

NOTE

ELETTROMECCANICA GIORDANO COLOMBO S.r.l. COLOMBO S.r.l. s not liable at all for damages to people depending on recycling any electrical spindle part differently from its riutilizzo di singole parti dell'Elettromandrino per original use.

ELETTROMECCANICA GIORDANO COLOMBO S.r.l. does not at all recognize any different part use suitability after the to, electrical spindle dismantling for disposal.

As to finally dispose of the electrical spindle, comply with procedere nel seguente modo per separare le va- hereby specified instructions :

- Check that the unit is no longer operating and cut from the electric, hydraulic and pneumatic supply thus avoiding any unit or part uncontrolled movement.
- Cut the electrical spindle from any unit.
- Dismantle the different spindle parts.
- Separate any electric material (copper housing) from plastic and metal parts.
- Differently dispose the parts according to any regulation in force in eachs ingle country.

*In case of doubts, get in touch with **ELETTROMECCANICA GIORDANO COLOMBO S.r.l.** service.*

ATTENTION

- ! As for demolition and disposal, only rely on qualified personnel.



ELETTROMECCANICA GIORDANO COLOMBO S.r.l.

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Tool Products

OPERATOR'S MANUAL

INCLUDING: OPERATION, INSTALLATION & MAINTENANCE

SECTION M40
MANUAL 36

Released: 9/72

Revised: 12-22-95

Form: 036-2

"0" SERIES POWER MOTORS ("0" AND "2200" SERIES GEARING)

Models: 8226-()A, 8229-()A, 8230-()A and 8232-().



⚠ WARNING

**READ THIS MANUAL CAREFULLY BEFORE INSTALLING,
OPERATING OR SERVICING THIS EQUIPMENT.**

FAILURE TO OBSERVE THE FOLLOWING WARNINGS COULD RESULT IN INJURY.

Pneumatic tools should always be installed and used in accordance with A.N.S.I. B186.1 "Safety Code For Portable Air Tools."

⚠ WARNING

- Operate this tool at 90 p.s.i.g. (6.2 bar) maximum air pressure at the air inlet of the tool.
- Disconnect air supply from tool before performing maintenance procedures.
- Keep hands, clothing and long hair away from rotating end of tool.
- Anticipate and be alert for sudden changes in motion during start up and operation of any power tool.
- Never exceed rated r.p.m. of tool.
- Wear suitable eye and hearing protection while operating tool.
- Do not lubricate tools with flammable or volatile liquids such as kerosene, diesel or jet fuel.
- Do not remove any labels. Replace any damaged label.
- Use only accessories recommended by ARO.

NOTICE

- The use of other than genuine ARO replacement parts may result in safety hazards, decreased tool performance and increased maintenance and may invalidate all warranties.
- ARO is not responsible for customer modification of tools for applications on which ARO was not consulted.
- Tool maintenance and repair should be performed by authorized, trained, competent personnel. Consult your nearest ARO authorized servicer.
- It is the responsibility of the employer to place the information in this manual into the hands of the operator.

For parts and service information, contact your local ARO distributor, or the Customer Service Dept. of the Ingersoll-Rand Distribution Center, White House, TN at PH: (615) 672-0321, FAX: (615) 672-0801.

ARO Tool Products

Ingersoll-Rand Company

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Part of worldwide Ingersoll-Rand

FAILURE TO OBSERVE THE FOLLOWING WARNINGS COULD RESULT IN INJURY.

⚠ WARNING



Wear eye protection when operating or performing maintenance on this tool.

⚠ WARNING



Turn off air supply and disconnect air supply hose before installing, removing or adjusting any accessory on this tool, or before performing any maintenance on this tool.

⚠ WARNING



Do not use damaged, frayed or deteriorated air hoses and fittings.

⚠ WARNING



Wear hearing protection when operating this tool.

⚠ WARNING



Do not overreach when operating this tool. Keep body stance balanced and firm.

⚠ WARNING



Operate at 90 p.s.i.g. (6.2 bar/620 kPa) maximum air pressure.

WARNING = Hazards or unsafe practices which could result in severe personal injury, death or substantial property damage.

CAUTION = Hazards or unsafe practices which could result in minor personal injury or product or property damage.

NOTICE = Important installation, operation or maintenance information.

MODEL IDENTIFICATION

MODEL NUMBER	TOTAL RED.	RATED R.P.M.	MOTOR ASSEMBLY	ADAPTER GEARING	AUXILIARY GEARING	DRIVE GEARING
8226-6A	27.4:1	700	37960-1	42501		40830
8226-7A	41.3:1	450	37959-1	42500		40831
8226-8A	50.9:1	375	37960-1	42501		40831
8226-10A	109.7:1	170	37960-1	42501	40833	40830
8226-11A	165.1:1	110	37959-1	42500	40834	40830
8226-12A	203.8:1	90	37960-1	42501	40834	40830
8226-13A	306.7:1	60	37959-1	42500	40834	40831
8226-14A	378.5:1	50	37960-1	42501	40834	40831
8229-1A	1:1	19,000	37959-1			33808
8229-2A	3.4:1	5700	37959-1			33835
8229-3A	5.56:1	3500	37959-1			33836
8229-4A	6.86:1	2800	37960-1			34009
8229-5A	11.6:1	1650	37959-1		33853	33835
8229-6A	18.9:1	1000	37959-1		33837	33835
8229-7A	23.4:1	800	37960-1		39852	33835
8229-8A	30.9:1	600	37959-1		33837	33836
8229-9A	38.1:1	500	37960-1		39852	33836
8230-1A	1:1	19,000	37959-1			43637
8230-2A	3.4:1	5700	37959-1			34076
8230-3A	5.56:1	3500	37959-1			33361
8230-4A	6.86:1	2800	37960-1			39851
8230-5A	11.6:1	1650	37959-1		33853	34076
8230-6A	18.9:1	1000	37959-1		33837	34076
8230-7A	23.4:1	800	37960-1		39852	34076
8230-8A	30.9:1	600	37959-1		33837	33361
8230-9A	38.1:1	500	37960-1		39852	33361
8232-1	1:1	19,000	37959-1			39940
8232-2	3.4:1	5700	37959-1			39937
8232-3	5.56:1	3500	37959-1			39938
8232-4	6.86:1	2800	37960-1			39939
8232-5	11.6:1	1650	37959-1		33853	39937
8232-6	18.9:1	1000	37959-1		33837	39937
8232-7	23.4:1	800	37960-1		39852	39937

ROUTINE LUBRICATION REQUIREMENTS

Lack of or an excessive amount of lubrication will affect the performance and life of this tool. Use only recommended lubricants at below time intervals:

EVERY 8 HOURS OF TOOL OPERATION – Fill lubricator reservoir of recommended F.R.L. with spindle oil (29665). If an in line or air line lubricator is not used, apply several drops of spindle oil (29665) in air inlet.

EVERY 40 HOURS OF TOOL OPERATION – Flush tool with a solution of three (3) parts cleaning solvent to one (1) part spindle oil (or use kerosene).

EVERY 160 HOURS OF TOOL OPERATION – Lubricate gearing. Pack bearings, coat shafts and lubricate gears with NLGI #1 “EP” grease (33153).

AIR SUPPLY REQUIREMENTS

For maximum operating efficiency, the following air supply specifications should be maintained to this air tool:

- AIR PRESSURE – 90 p.s.i.g. (6.2 bar)
- AIR FILTRATION – 50 micron
- LUBRICATED AIR SUPPLY
- HOSE SIZE – 5/16” (8 mm) I.D.

An ARO® model C28231–810 air line FILTER/REGULATOR/LUBRICATOR (F.R.L.) is recommended to maintain the above air supply specifications.

RECOMMENDED LUBRICANTS

After disassembly is complete, all parts, except sealed or shielded bearings, should be washed with solvent. To relubricate parts, or for routine lubrication, use the following recommended lubricants:



Where Used	ARO Part #	Description
Air Motor	29665	1 qt Spindle Oil
“O” Rings & Lip Seals	36460	4 oz. Stringy Lubricant
Gears and Bearings	33153	5 lb. “EP” – NLGI #1 Grease

INSPECTION, MAINTENANCE AND INSTALLATION

Disconnect air supply from the tool or shut off air supply and exhaust (drain) line of compressed air before performing maintenance or service to the tool.

It is important that the tools be serviced and inspected at regular intervals for maintaining safe, trouble-free operation of the tool.

Be sure the tool is receiving adequate lubrication, as failure to lubricate can create hazardous operating conditions resulting from excessive wear.

Be sure that the air supply lines and connectors are of proper size to provide a sufficient quantity of air to the tool.

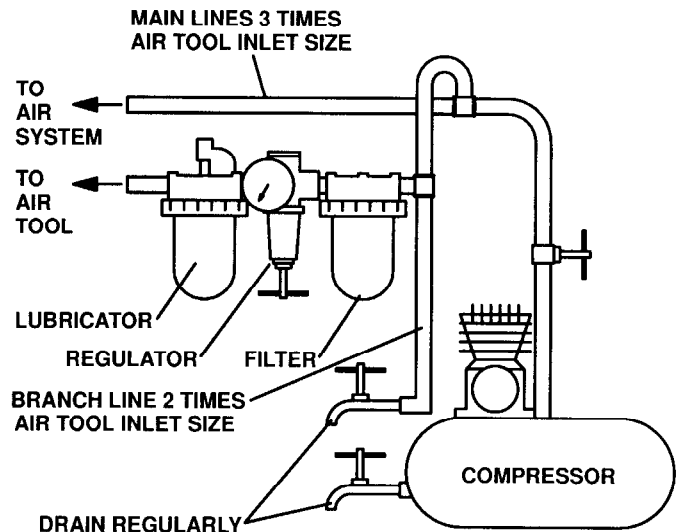
Tool maintenance and repair shall be performed by authorized, trained, competent personnel. Tools, hose and fittings shall be replaced if unsuitable for safe operation and responsibility should be assigned to be sure that all tools requiring guards or other safety devices shall be kept in legible condition. Maintenance and repair records should be maintained on all tools. Frequency of repair and the nature of the repairs can reveal unsafe application. Scheduled maintenance by competent authorized personnel should detect any mistreatment or abuse of the tool and worn parts. Corrective action should be taken before returning the tool for use.

Disassembly should be done on a clean work bench with a clean cloth spread to prevent the loss of small parts. After disassembly is completed, all parts should be thoroughly washed in a clean solvent, blown dry with air and inspected for wear levels, abuse and contamination. Double sealed or shielded bearings should never be placed in solvent unless a good method of re-lubricating the bearing is available. Open bearings may be washed but should not be allowed to spin while being blown dry.

Upon reassembling, lubricate parts where required. Use 33153 grease, or equivalent, in bearings. Use 36460 lubricant for “O” ring assembly. When assembling “O” rings or parts adjacent “O” rings, care must be exercised to prevent damage to the rubber sealing surfaces. A small amount of grease will usually hold steel balls and other small parts in place while assembling.

When replacement parts are necessary, consult drawing containing the part for identification.

Always use clean, dry air. Dust, corrosive fumes and/or excessive moisture can damage the motor of an air tool. An air line filter can greatly increase the life of an air tool. The filter removes rust, scale, moisture and other debris from the air lines. Low air pressure (less than 90 p.s.i.g.) reduces the speed of the air tool. High air pressure (more than 90 p.s.i.g.) raises performance beyond the rated capacity of the tool and could cause injury. Shown below is a typical piping arrangement.



DISASSEMBLY/ASSEMBLY INSTRUCTIONS

NOTICE

- Never apply excessive pressure by a holding device which may cause distortion of a part.
- Apply pressure evenly to parts which have a press fit.
- Apply even pressure to the bearing race that will be press fitted to the mating part.
- Use correct tools and fixtures when servicing this tool.
- Don't damage "O" rings when servicing this tool.
- Use only genuine ARO replacement parts for this tool. When ordering, specify part number, description, tool model number and serial number.

DRIVE GEARING DISASSEMBLY

MODELS 8226-()A

- Remove keys (121) from spindle.
- Remove screws (114) and washers (115), releasing drive gearing from tool.
- Grasp nose housing (126) in one hand and tap drive end of spindle with a soft face hammer; spindle and components will loosen from nose housing.
- Gearing should not be disassembled further unless damage is evident, as Brinelling of the bearing races may occur, making replacement necessary.
- To disassemble further, remove bearing (122).
- Rotate snap ring (108 or 118) so the open portion will allow the removal of one shaft (103).
- Remove shaft (103), releasing gear.
- Repeat for removal of opposite shaft and gear.
- To remove bearing (102), remove snap ring (108 or 118), insert shafts into spindle and alternately tap ends, loosening bearing.

MODELS 8229-()A AND 8230-()A

- Remove key (66) or nut (55) from spindle.
- Remove thread guard (56).
- Using wrenches on flats of ring gear (53) and adapter (36), unthread and remove drive gearing.
- Grasp ring gear in one hand and tap drive end of spindle with a soft face hammer; spindle and components will loosen from ring gear.
- Gearing should not be disassembled further unless damage is evident, as Brinelling of the bearing races may occur, making replacement necessary.
- To disassemble further, remove spring washer (52), bearing (51 or 57) and spacer.
- Remove shafts, releasing gears.
- To remove bearing (27), insert shafts into spindle and alternately tap ends, loosening bearing.

MODELS 8232-()

- Remove collet nut (81), releasing collet (80).
- Using wrenches on flats of ring gear (74) and adapter (36), unthread and remove drive gearing.
- Unthread and remove lock ring (79) and felt seal (78).
- Unthread and remove lock nut (77).
- Grasp ring gear in one hand and tap drive end of spindle with a soft face hammer; spindle and components will loosen from ring gear.
- Gearing should not be disassembled further unless damage is evident, as Brinelling of the bearing races may occur, making replacement necessary.
- To disassemble further, alternately tap ends of shafts to remove bearing (27) and washer (28).
- Remove shafts from spindle, releasing gears.

DRIVE GEARING ASSEMBLY

MODELS 8226-()A

- Assemble snap ring (108 or 118) to spindle.
- Pack bearing (102) with ARO 33153 grease and assemble to spindle, pressing on inner race of bearing.
- Lubricate gears and needle bearings (104) liberally with ARO 33153 grease and assemble one gear to spindle, securing with shaft.

- Repeat for assembly of opposite shaft and gear. Gearing should contain approximately 1/4 oz. (7 g) of grease.
- Rotate opening of snap ring 90° from either shaft.
- Assemble bearing (122) to spindle, pressing on inner race of bearing.
- Lubricate seal (125) with ARO 36460 lube and assemble into nose housing (126). NOTE: Assemble seal with lips toward gearing.
- Assemble washer (124), wave washer (123) and spindle and components into nose housing.
- Assemble nose housing to housing (111) and secure with screws (114) and washers (115). NOTE: Assemble gearing to motor housing (7) before assembling motor assembly or head (1) to tool (see "MOTOR ASSEMBLY").
- Assemble spacer (127) and keys (121) to spindle.

MODELS 8229-()A AND 8230-()A

- Assemble spacer and bearing (51 or 57) to spindle, pressing on inner race of bearing.
- Lubricate gears liberally with ARO 33153 grease and assemble to spindle, securing with shafts. NOTE: Be sure each shaft (29) contains 15 needle bearings. Gearing should contain approximately 1/8 oz. (3.5 g) of grease.
- Pack bearing (27) with ARO 33153 grease and assemble spacer (28)(where applicable) and bearing (27) to spindle, pressing on inner race of bearing.
- Assemble washer (52)(large diameter toward bearing) and gearing into ring gear (53).
- Assemble ring gear and components to tool and tighten, using wrenches on flats of ring gear (53) and adapter (36).
- Assemble thread guard (56) to ring gear.
- Assemble key (66) or nut (55) to spindle.

MODELS 8232-()

- Lubricate gears liberally with ARO 33153 grease and assemble to spindle, securing with shafts. NOTE: Be sure each shaft (29) contains 15 needle bearings. Gearing should contain approximately 1/8 oz. (3.5 g) of grease.
- Pack bearing (27) with ARO 33153 grease and assemble washer (28) and bearing (27) to spindle, pressing on inner race of bearing.
- Pack bearings (76 or 83) with ARO 33153 grease and assemble into ring gear, pressing on outer race of bearings. NOTE: Assemble bearings with unmarked faces together.
- Assemble felt seal (78) to lock ring (79) and assemble lock ring to ring gear (74), securing bearings.
- Assemble spindle and components into ring gear (74).
- Assemble lock nut (77) to spindle.
- Assemble ring gear and components to tool and tighten, using wrenches on flats of ring gear (74) and adapter (36).
- Assemble collet (80) and collet nut (81) to spindle.

AUXILIARY GEARING DISASSEMBLY

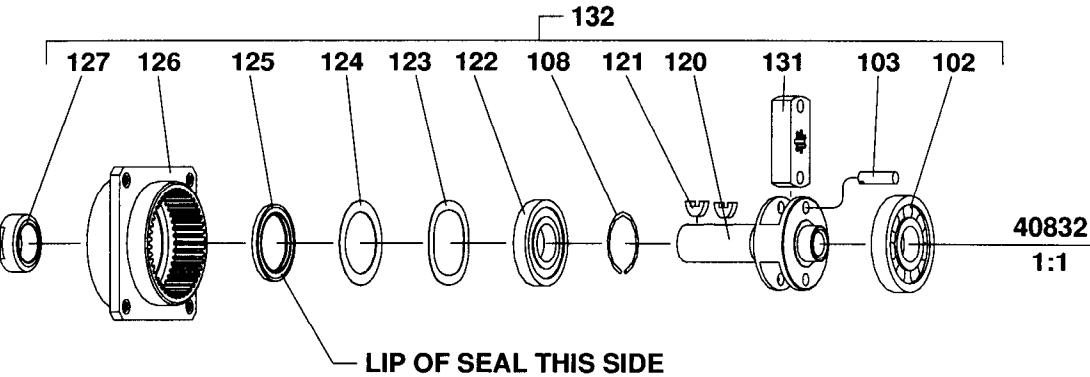
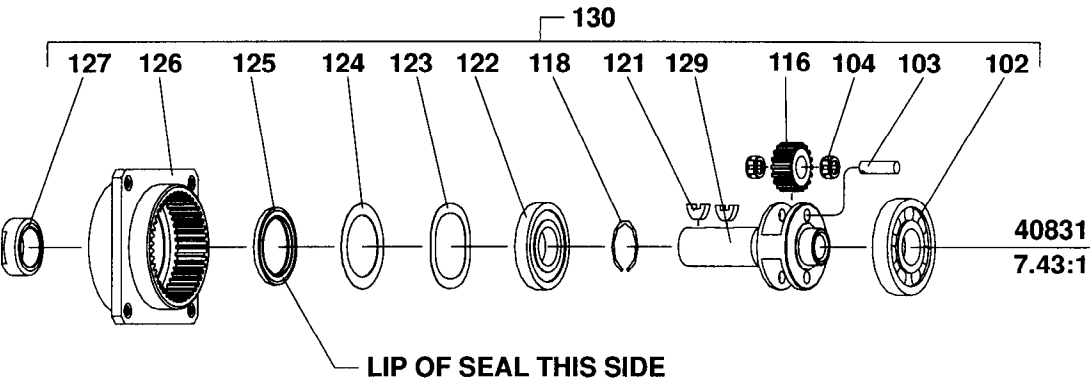
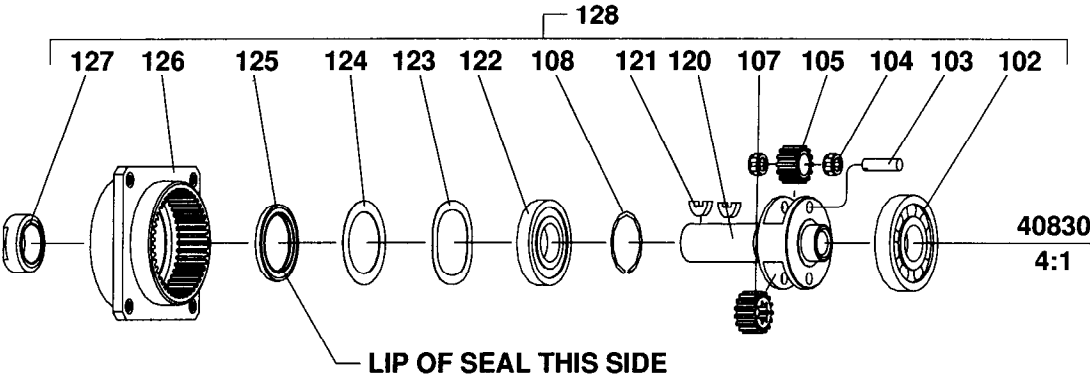
MODELS 8226-()A

- Remove drive gearing from tool.
- Remove screws (100) and washers (101), releasing auxiliary gearing (113 or 119).
- Grasp housing (111) in one hand and tap drive end of spindle with a soft face hammer; spindle and components will loosen from housing.
- Gearing should not be disassembled further unless damage is evident, as Brinelling of the bearing races may occur, making replacement necessary.
- To disassemble further, remove bearing (109).
- Rotate snap ring (108 or 118) so the open portion will allow the removal of one shaft (103).
- Remove shaft (103), releasing gear.
- Repeat for removal of opposite shaft and gear.
- To remove bearing (102), remove snap ring, insert shafts into spindle and alternately tap ends, loosening bearing.

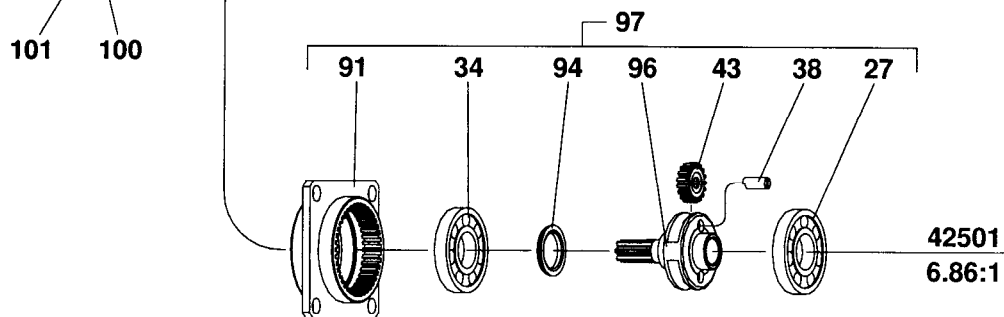
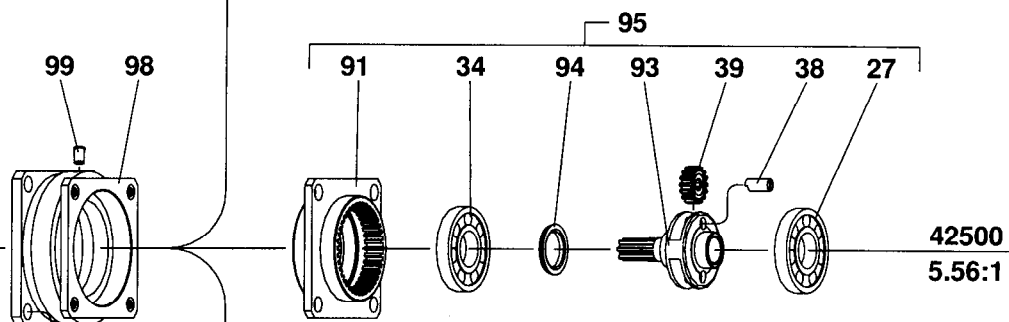
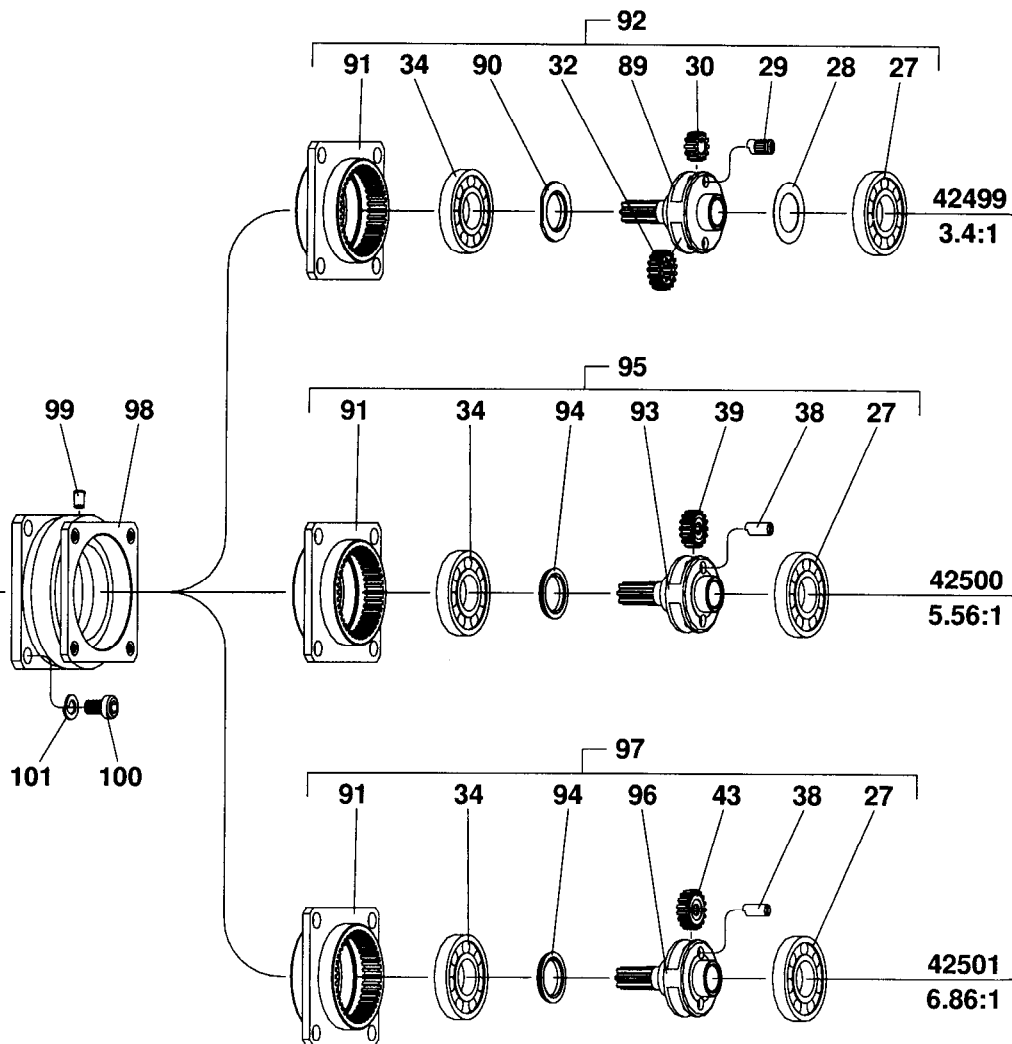
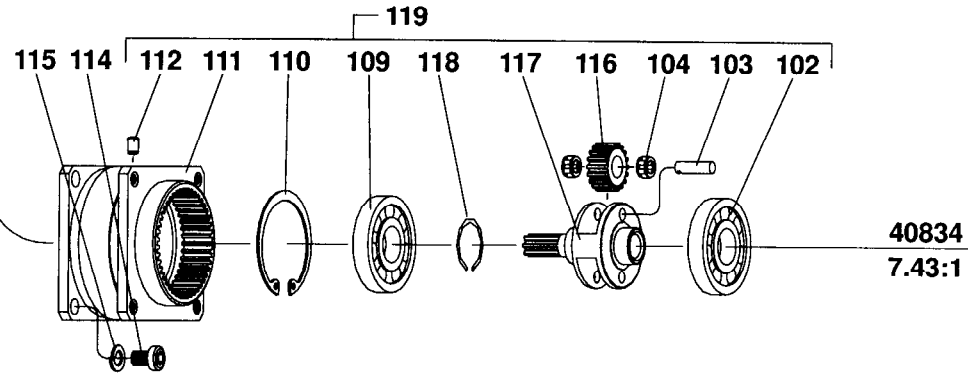
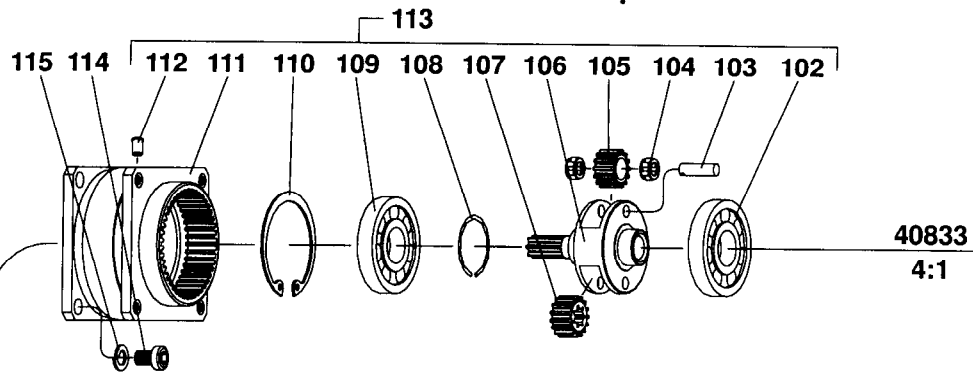
(CONTINUED ON PAGE 13)

**DRIVE GEARING
MODELS 8226-()A**

**M40
36**

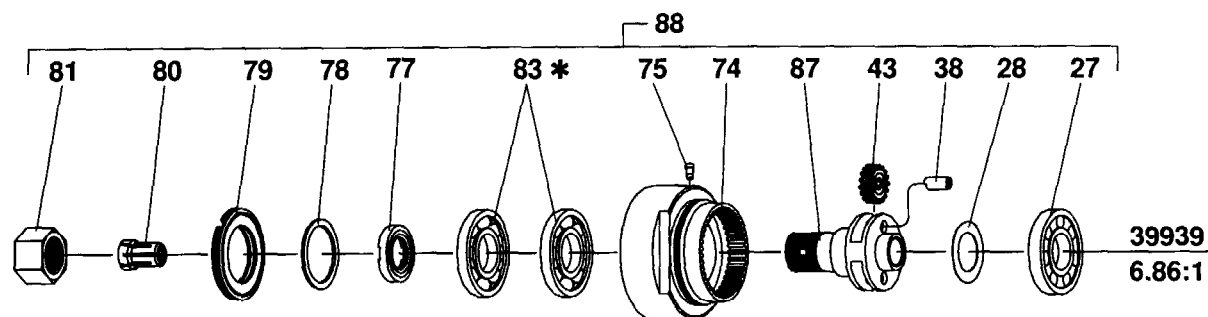
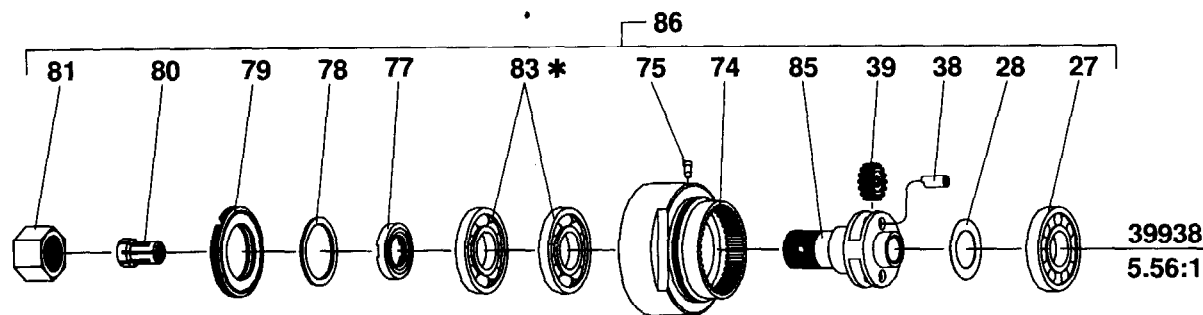
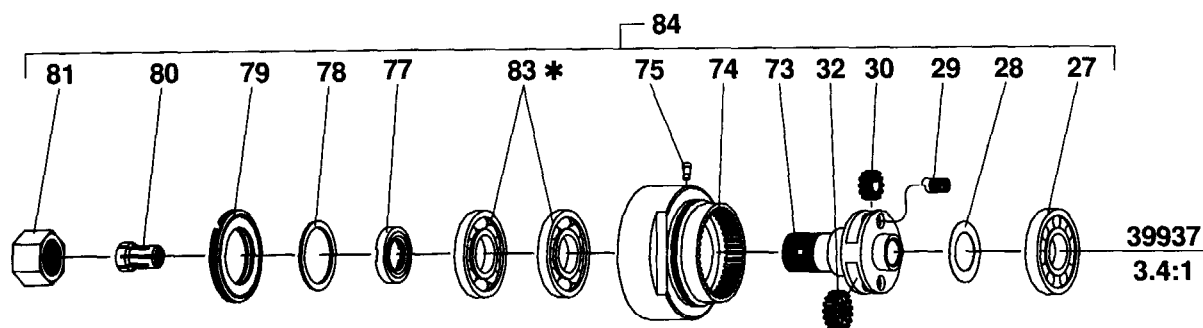
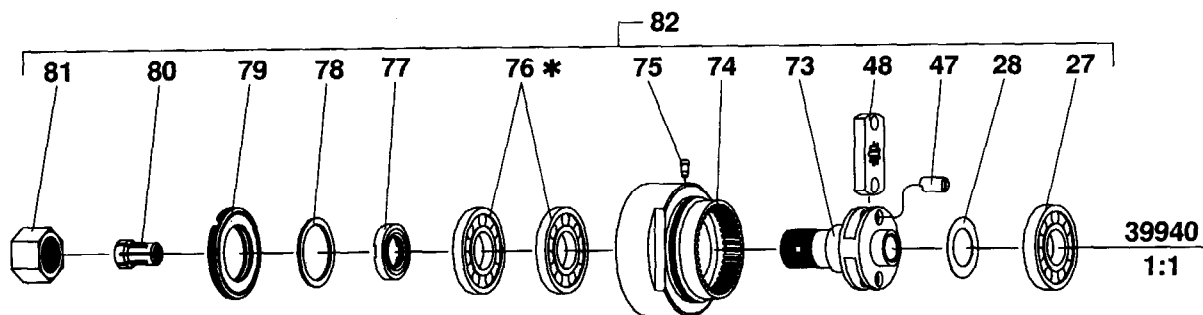


8226-()A AUXILIARY GEARING



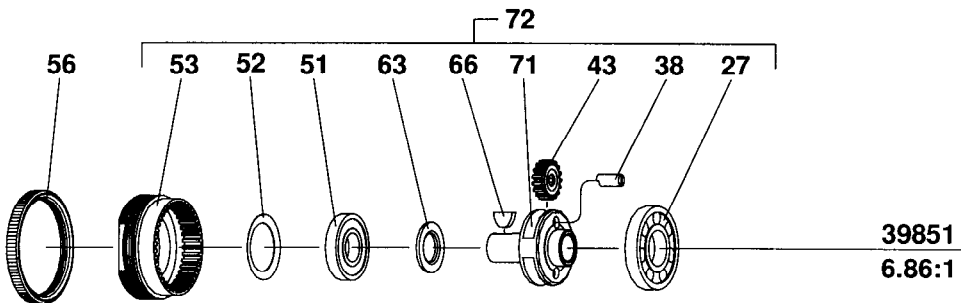
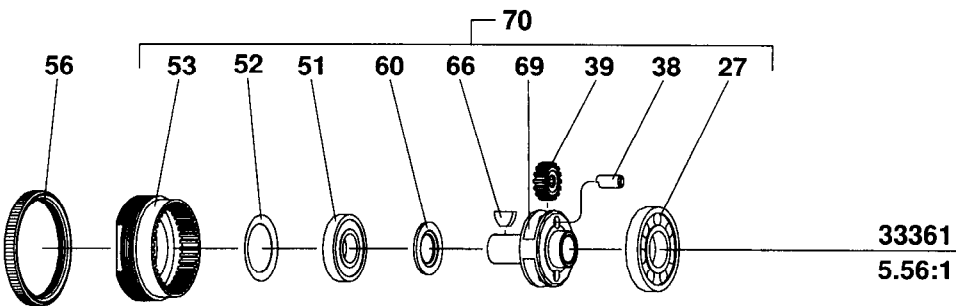
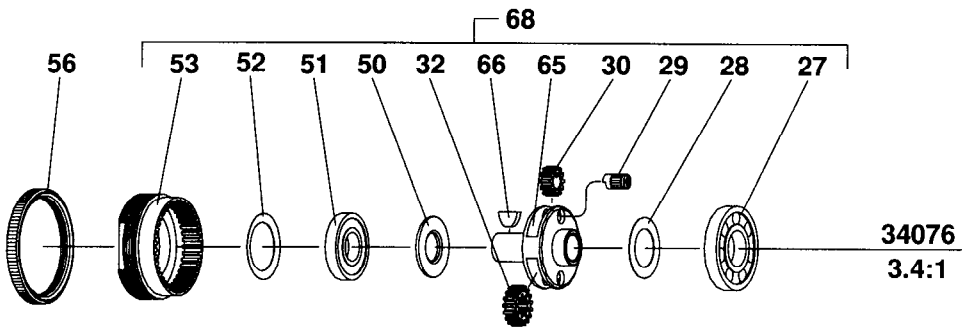
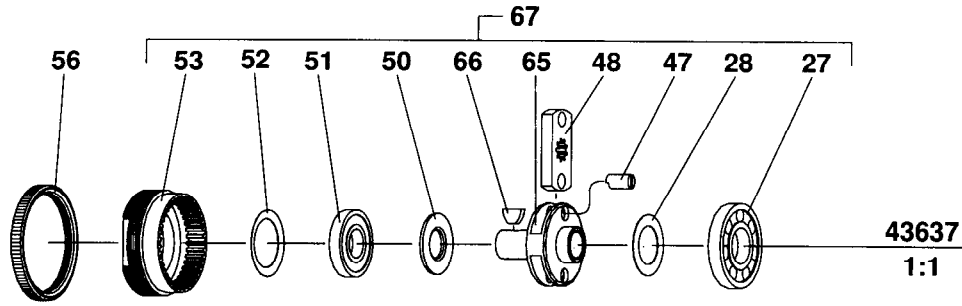
8232-() DRIVE GEARING

M40
36



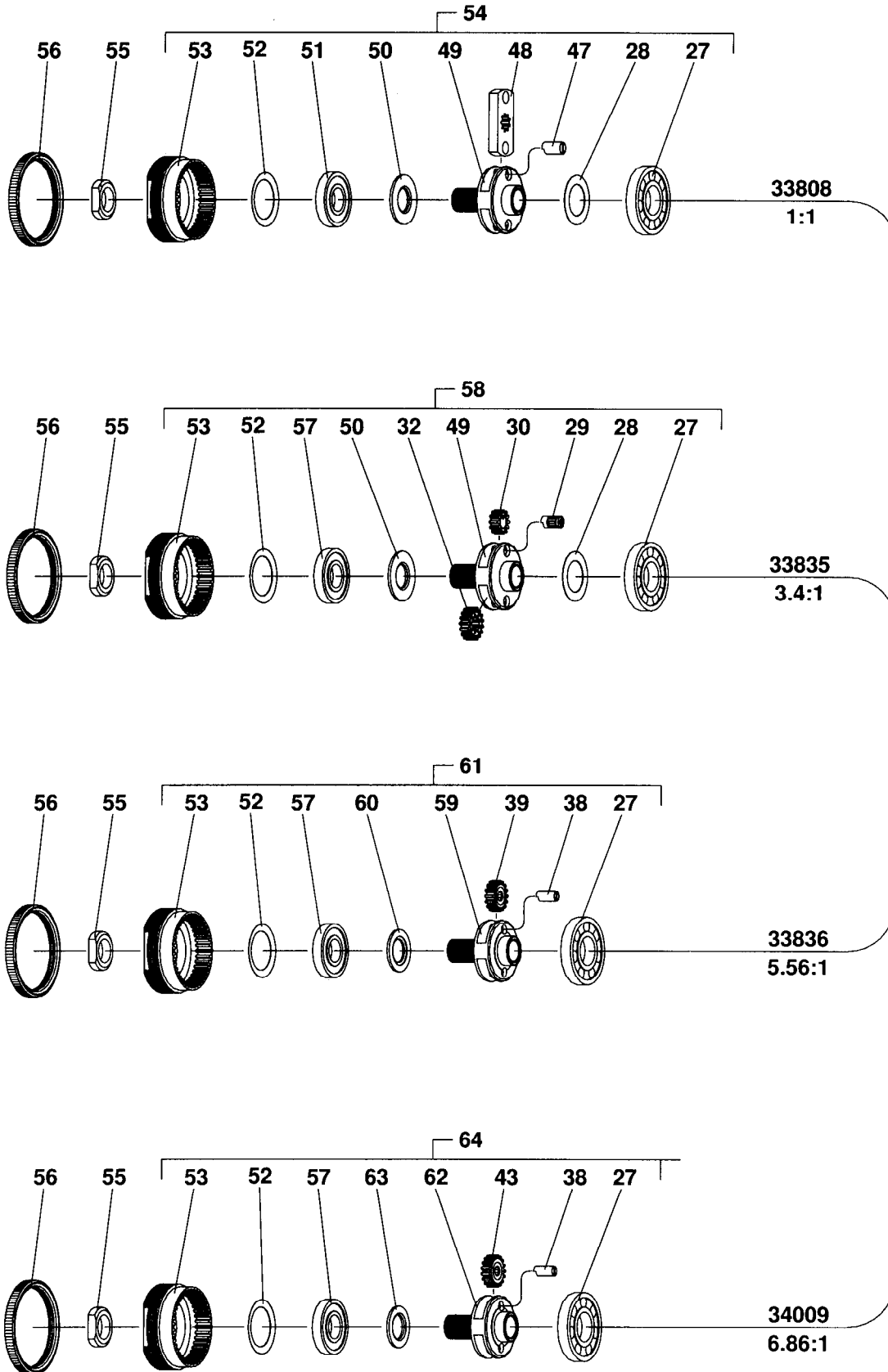
* ASSEMBLE WITH UNMARKED FACES TOGETHER

8230-()A DRIVE GEARING

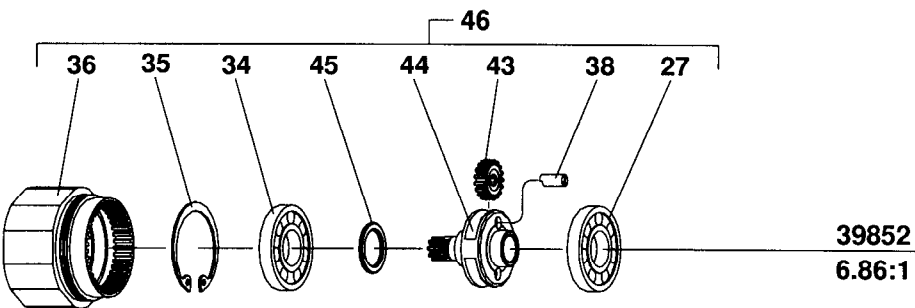
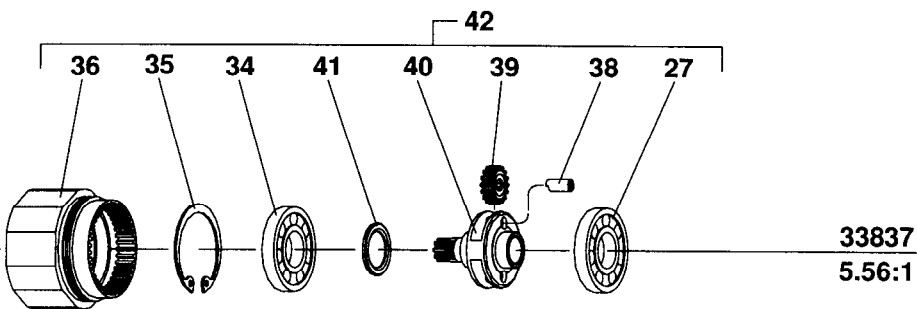
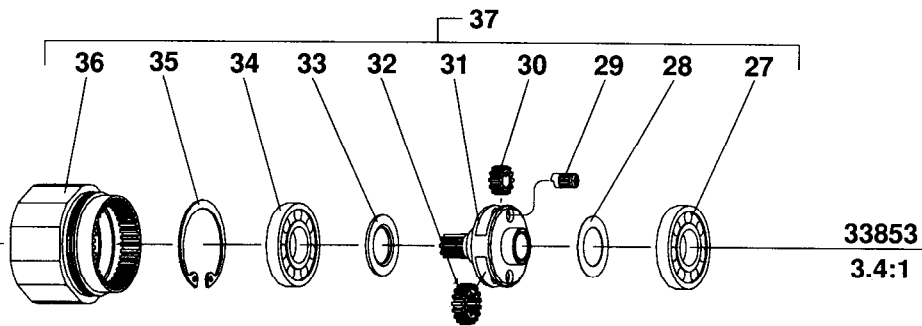


8229-()A DRIVE GEARING

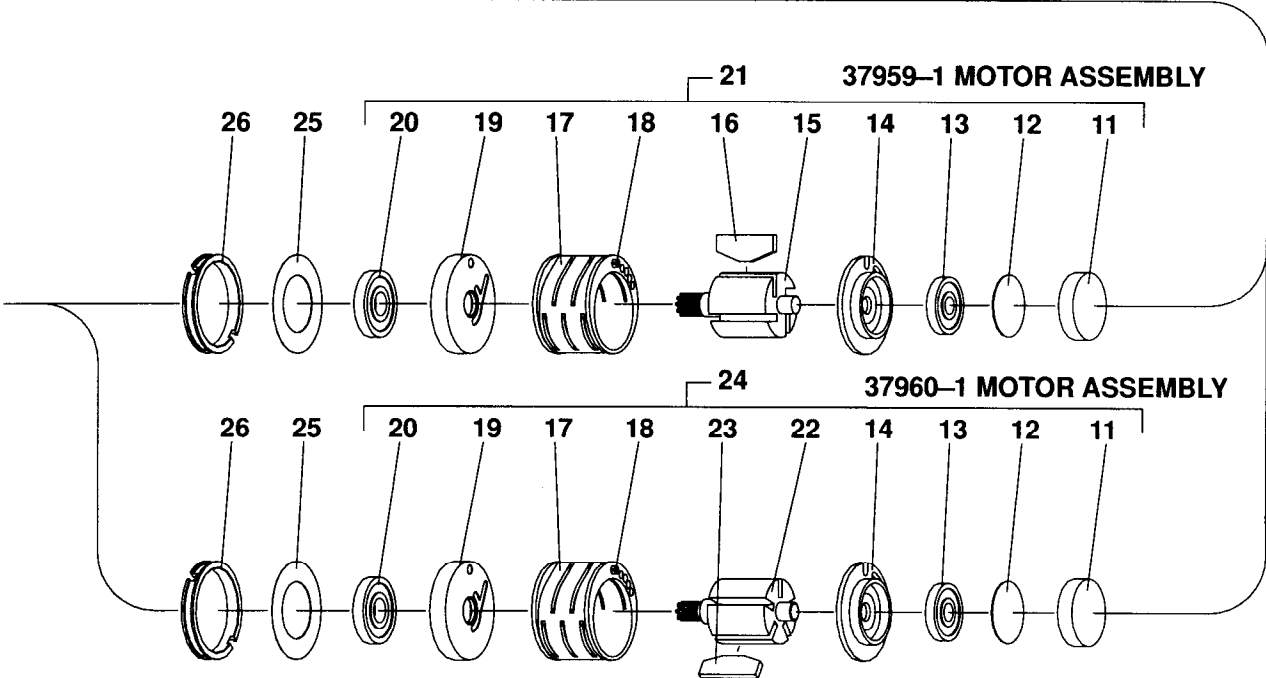
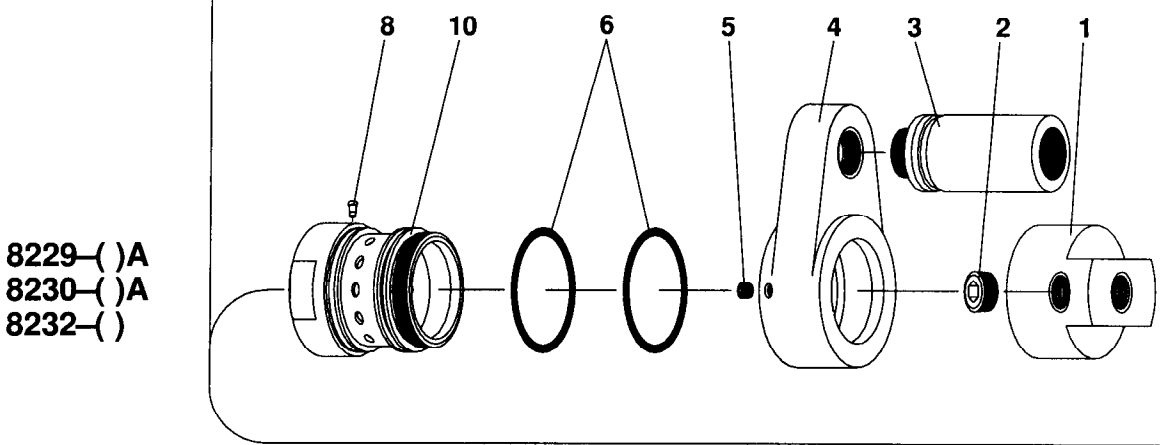
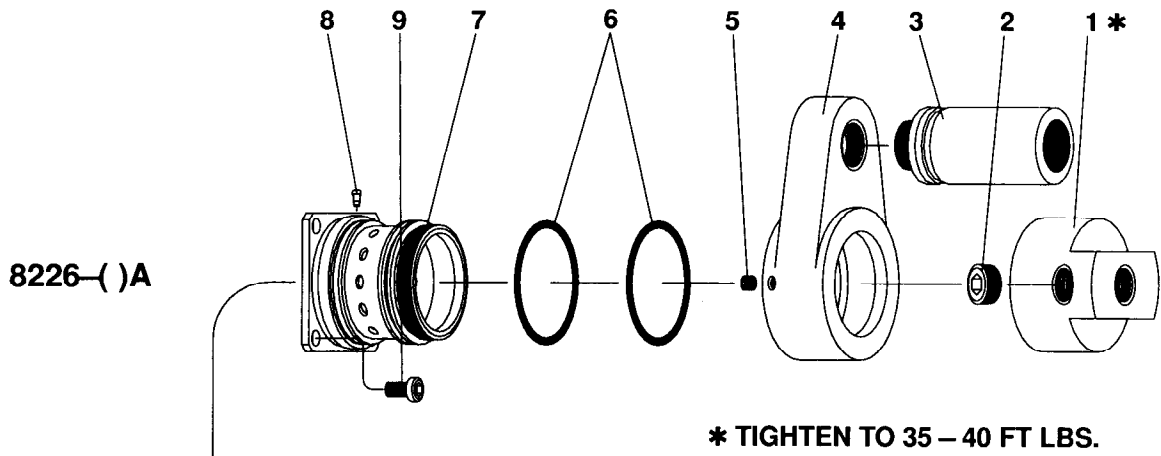
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AUXILIARY GEARING **MODELS 8229-()A, 8230-()A AND 8232-()**



NOT SHOWN
30470 WRENCH (MODELS 8232-() ONLY)



PART NUMBER FOR ORDERING

PART NUMBER FOR ORDERING

1	Housing Cap	42519	67	Drive Gearing Assembly (1:1)	43637
2	Plug	Y227-3	68	Drive Gearing Assembly (3.4:1)	34076
3	Muffler Assembly	43551-3	69	Spindle	33963
4	Manifold Assembly (includes item 5)	43556	70	Drive Gearing Assembly (5.56:1)	33361
5	Screw	Y23-102	71	Spindle	39848
6	"O" Ring (2 req'd)	Y325-127	72	Drive Gearing Assembly (6.86:1)	39851
7	Housing Assembly (includes item 8)	42486	73	Spindle	39934
8	Grease Fitting	35967	74	Ring Gear (includes item 75)	39984
9	Screw (4 req'd)	Y154-53	75	Grease Fitting	35967
10	Housing Assembly (includes item 8)	43634	76	Ball Bearing (2 req'd)	34682
11	Cap	38783	77	Lock Nut	38718
12	Shield	38805	78	Felt Seal	38720
13	Bearing	Y65-7	79	Lock Ring	38719
14	Rear End Plate	37956	80	Collet	31812-8
15	Rotor	30745	81	Collet Nut	38721
16	Rotor Blade (4 req'd)	30741	82	Drive Gearing Assembly (1:1)	39940
17	Cylinder Assembly (includes item 18) ...	37958	83	Ball Bearing (2 req'd)	48305-1
18	Roll Pin (2 req'd)	Y178-22	84	Drive Gearing Assembly (3.4:1)	39937
19	Front End Plate	31158	85	Spindle	39935
20	Bearing	Y65-15	86	Drive Gearing Assembly (5.56:1)	39938
21	Motor Assembly	37959-1	87	Spindle	39936
22	Rotor	31633	88	Drive Gearing Assembly (6.86:1)	39939
23	Rotor Blade (5 req'd)	31363	89	Spindle	42496
24	Motor Assembly	37960-1	90	Spacer	33691
25	Spacer	32310	91	Ring Gear	40499
26	Spacer	32305	92	Adapter Gearing Assembly (3.4:1)	42499
27	Bearing	32325	93	Spindle	42497
28	Washer	37676	94	Spacer	33693
29	Shaft (2 req'd)(includes 15 needle bearings per shaft)	33686	95	Adapter Gearing Assembly (5.56:1)	42500
30	Planet Gear (2 req'd)	30899	96	Spindle	42498
31	Spindle	37667	97	Adapter Gearing Assembly (6.86:1)	42501
32	Spur Gear	30901	98	Adapter (includes item 99)	42502
33	Spacer	32314	99	Grease Fitting	35323
34	Bearing	32325	100	Screw (4 req'd)	Y154-52-C
35	Retaining Ring	Y147-7	101	Washer (4 req'd)	Y14-10
36	Adapter	32326	102	Ball Bearing	33704
37	Auxiliary Gearing Assembly (3.4:1)	33853	103	Shaft (2 req'd)	40841
38	Shaft (2 req'd)	33436	104	Needle Bearing (4 req'd)	42271
39	Planet Gear (2 req'd)	33440	105	Planet Gear (2 req'd)	46417
40	Spindle	33425	106	Spindle	40839
41	Spacer	32312	107	Spur Gear	34574
42	Auxiliary Gearing Assembly (5.56:1)	33837	108	Snap Ring	40842
43	Planet Gear (2 req'd)	33438	109	Ball Bearing	33704
44	Spindle	39849	110	Snap Ring	33708
45	Spacer	39850	111	Gear Housing (includes item 112)	37968
46	Auxiliary Gearing Assembly (6.86:1)	39852	112	Grease Fitting	35323
47	Shaft (2 req'd)	30765	113	Auxiliary Gearing Assembly (4:1)	40833
48	Drive Spline	32833	114	Screw (4 req'd)	Y154-52-C
49	Spindle	37669	115	Washer (4 req'd)	Y14-10
50	Spacer	32315	116	Planet Gear (2 req'd)	46416
51	Bearing	Y65-13	117	Spindle	40840
52	Spring Washer	32544	118	Snap Ring	40843
53	Ring Gear	32935	119	Auxiliary Gearing Assembly (7.43:1)	40834
54	Drive Gearing Assembly (1:1)	33808	120	Spindle	40837
55	Nut	30756-1	121	Key (2 req'd)	41277
56	Thread Guard	32070	122	Ball Bearing	33706
57	Bearing	36546	123	Wave Washer	47589
58	Drive Gearing Assembly (3.4:1)	33835	124	Washer	47590
59	Spindle	33427	125	Seal	37389
60	Spacer	32313	126	Nose Housing	37878
61	Drive Gearing Assembly (5.56:1)	33836	127	Spacer	33697
62	Spindle	33423	128	Drive Gearing Assembly (4:1)	40830
63	Spacer	32311	129	Spindle	40838
64	Drive Gearing Assembly (6.86:1)	34009	130	Drive Gearing Assembly (7.43:1)	40831
65	Spindle	37671	131	Drive Spline	34488
66	Key	Y62-2	132	Drive Gearing Assembly (1:1)	40832

MODELS 8229-()A, 8230-()A AND 8232-()

- Remove drive gearing from tool.
- Using wrenches on flats of adapter (36) and motor housing (10), unthread and remove gearing.
- Grasp adapter (36) in one hand and tap splined end of spindle with a soft face hammer; spindle and components will loosen from adapter.
- Gearing should not be disassembled further unless damage is evident, as Brinelling of the bearing races may occur, making replacement necessary.
- To disassemble further, remove bearing (34) and spacer from spindle.
- Remove shafts (29 or 38), releasing gears.
- To remove bearing (27), insert shafts into spindle and alternately tap ends, loosening bearing.

AUXILIARY GEARING ASSEMBLY

MODELS 8226-()A

- Assemble snap ring (110) to housing (111).
- Assemble snap ring (108 or 118) to spindle.
- Pack bearing (102) with ARO 33153 grease and assemble to spindle, pressing on inner race of bearing.
- Lubricate gears and needle bearings (104) liberally with ARO 33153 grease and assemble one gear to spindle, securing with shaft.
- Repeat for assembly of opposite shaft and gear. Gearing should contain approximately 1/4 oz. (7 g) of grease.
- Rotate opening of snap ring 90° from either shaft.
- Pack bearing (109) with ARO 33153 grease and assemble to spindle, pressing on inner race of bearing.
- Assemble spindle and components into housing (111).
- Assemble housing (111) and components to adapter (98) and secure with screws (100) and washers (101). NOTE: Assemble gearing to motor housing (7) before assembling motor assembly or head (1) to tool (see "MOTOR ASSEMBLY"). Align grease fitting (112) with grease fitting (99).
- Assemble drive gearing to tool.

MODELS 8229-()A, 8230-()A AND 8232-()

- Assemble retaining ring (35) to adapter (36).
- Pack bearing (34) with ARO 33153 grease and assemble spacer and bearing to spindle, pressing on inner race of bearing.
- Lubricate gears liberally with ARO 33153 grease and assemble to spindle, securing with shafts. NOTE: Be sure each shaft (29) contains 15 needle bearings. Gearing should contain approximately 1/8 oz. (3.5 g) of grease.
- Pack bearing (27) with ARO 33153 grease and assemble spacer (28)(where applicable) and bearing (27) to spindle, pressing on inner race of bearing.
- Assemble spindle and components into adapter (36).
- Assemble adapter (36) and components to tool and tighten, using wrenches on flats of adapter (36) and motor housing (10).
- Assemble drive gearing to tool.

ADAPTER GEARING DISASSEMBLY

- Remove drive and auxiliary gearing from tool.
- Remove screws (9), releasing adapter gearing from tool.
- Grasp ring gear (91) in one hand and tap splined end of spindle with a soft face hammer; spindle and components will loosen from ring gear.
- Gearing should not be disassembled further unless damage is evident, as Brinelling of the bearing races may occur, making replacement necessary.
- To disassemble further, remove bearing (34) and spacer from spindle.
- Remove shafts (29 or 38), releasing gears.
- To remove bearing (27), insert shafts into spindle and alternately tap ends, loosening bearing.

ADAPTER GEARING ASSEMBLY

- Pack bearing (34) with ARO 33153 grease and assemble spacer (90 or 94) and bearing to spindle, pressing on inner race of bearing.

- Lubricate gears liberally with ARO 33153 grease and assemble to spindle, securing with shafts. NOTE: Be sure each shaft (29) contains 15 needle bearings. Gearing should contain approximately 1/8 oz. (3.5 g) of grease.
- Pack bearing (27) with ARO 33153 grease and assemble spacer (28)(where applicable) and bearing to spindle, pressing on inner race of bearing.
- Assemble spindle and components into ring gear (91).
- Assemble ring gear (91) and components to motor housing (7) and secure with screws (9). NOTE: Assemble gearing to motor housing (7) before assembling motor assembly or head (1) to tool (see "MOTOR ASSEMBLY").

MOTOR DISASSEMBLY

- The motor assembly can be removed from either end of motor housing (7 or 10).
- To remove from "gearing" end of motor housing, remove gearing from tool.
- Remove spacers (26 and 25) and motor assembly from motor housing.
- Remove cap (11) and shield (12) from end plate (13).
- Grasp cylinder in one hand and tap splined end of rotor with a soft face hammer; motor will come apart.
- Remove bearing (13) and end plate (14) from rotor.

MOTOR ASSEMBLY

- Assemble bearing (13) to end plate (14), pressing on outer race of bearing.
- Assemble end plate (14) to rotor, pressing on inner race of bearing.
- Coat rotor blades (16 or 23) with ARO 29665 spindle oil and assemble to rotor slots — straight side out.
- Coat i.d. of cylinder (17) with ARO 29665 spindle oil and assemble over rotor, aligning roll pin (18) and air inlet slots in end of cylinder with holes in end plate.
- Assemble bearing (20) to end plate (19), pressing on outer race of bearing.
- Assemble end plate (19) to rotor, pressing on inner race of bearing. NOTE: Align hole in end plate with roll pin (18) in cylinder. Be sure rotor turns without binding.
- Assemble shield (12) and cap (11) to rear end plate (14).
- Models 8229-()A, 8230-()A and 8232-() — Assemble motor assembly into motor housing (10), aligning roll pin (18) with .1065" diameter blind hole in head (largest hole). Assemble spacers (25 and 26) and gearing to motor housing (10).
- Models 8226-()A — Assemble gearing to motor housing (7). Place head (1) in a vise, with the motor end upright. Place motor assembly on head (1), aligning roll pin (18) with .1065" diameter blind hole (largest hole). Assemble spacers (25 and 26) to motor. Assemble motor housing (7), with gearing and manifold attached, over motor and thread to head. NOTE: Tighten to 35 — 40 ft lbs.

MANIFOLD DISASSEMBLY

- Remove muffler (3) from manifold (4).
- Place head (1) in a vise, clamping on flats.
- Unthread and remove motor housing (7 or 10).
- Unthread set screw (5) and slide manifold off housing.

MANIFOLD ASSEMBLY

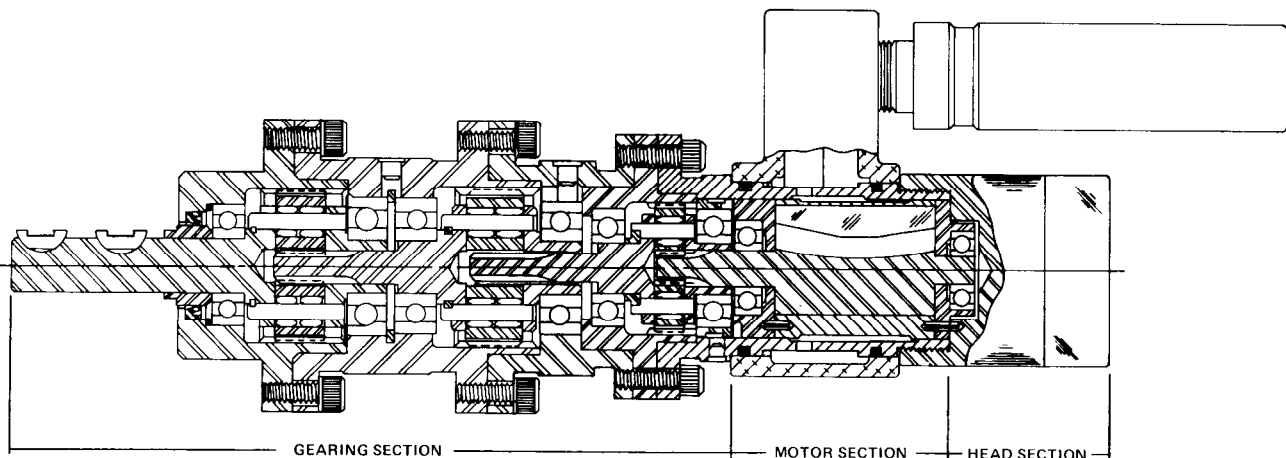
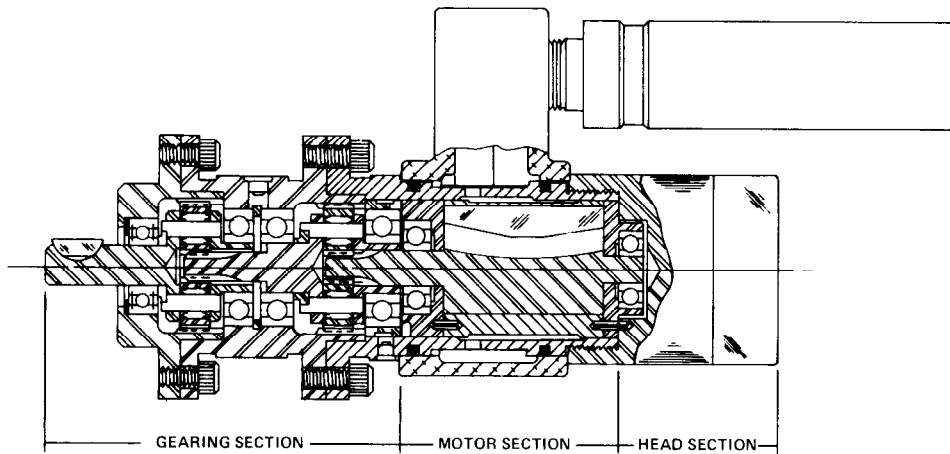
- Grease "O" rings (6) with ARO 36460 lube and assemble to grooves in motor housing (7 or 10).
- Assemble manifold (4) to motor housing.
- Assemble motor assembly and gearing to tool (see "MOTOR ASSEMBLY").
- Assemble head (1) to motor housing. NOTE: For models 8226-()A, tighten to 35 — 40 ft lbs.
- Rotate manifold so muffler will be located approximately 180° from cylinder exhaust slots and tighten set screw (5).
- Assemble muffler (3) to manifold.

TROUBLE SHOOTING

LISTED BELOW ARE SOME OF THE MOST COMMON CAUSES FOR THE POWER MOTOR TO MALFUNCTION. MALFUNCTIONS BEYOND THE SCOPE OF THIS MANUAL SHOULD BE BROUGHT TO THE ATTENTION OF YOUR ARO REPRESENTATIVE OR RETURN THE TOOL TO THE FACTORY FOR REPAIR.

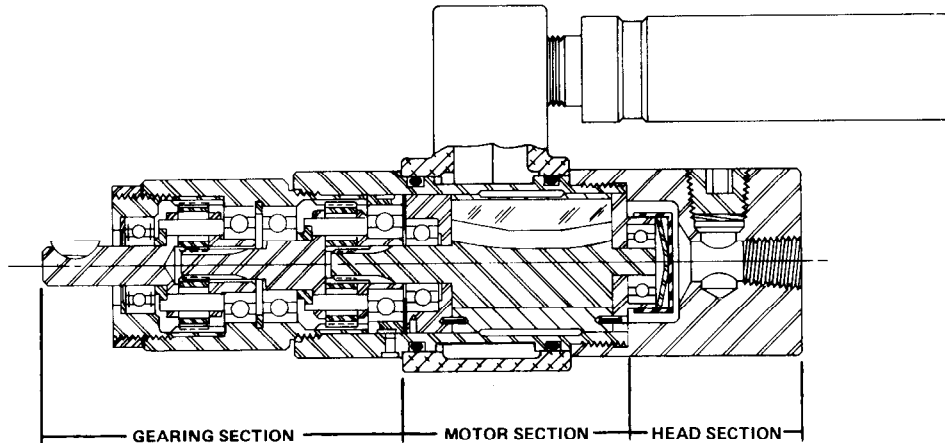
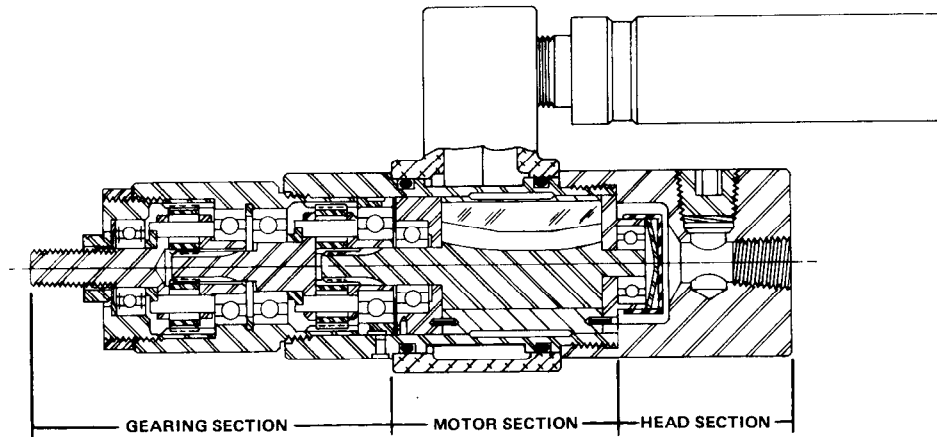
CONDITION	POSSIBLE CAUSE	CORRECTIVE ACTION
LOW SPEED OR FAILURE TO OPERATE.	1. INADEQUATE AIR SUPPLY.	1. CHECK AIR SUPPLY FOR CORRECT REGULATOR ADJUSTMENT (90 P.S.I.G. MAX. WHEN TOOL IS OPERATING).
	2. MOTOR AND/OR GEARING NOT BEING PROPERLY LUBRICATED.	2. REFER TO AIR AND LUBE REQUIREMENTS, PAGE 3.
	3. CLOGGED MUFFLER.	3. REPLACE MUFFLER.
	4. CLOGGED AIR INLET TO MOTOR. STICKING, BADLY WORN OR BROKEN ROTOR BLADES OR BEARING IN MOTOR.	4. DISASSEMBLE, CLEAN, INSPECT. REPLACE BADLY WORN OR BROKEN ROTOR BLADES OR BEARINGS. REFER TO MOTOR DISASSEMBLY/ASSEMBLY, PAGE 14.
	5. BADLY WORN BEARINGS OR GEARS IN GEARING SECTION.	5. DISASSEMBLE, CLEAN, INSPECT. REPLACE WORN OR DAMAGED PARTS. LUBRICATE. REFER TO GEARING DISASSEMBLY/ASSEMBLY.

TYPICAL CROSS SECTION OF TOOLS

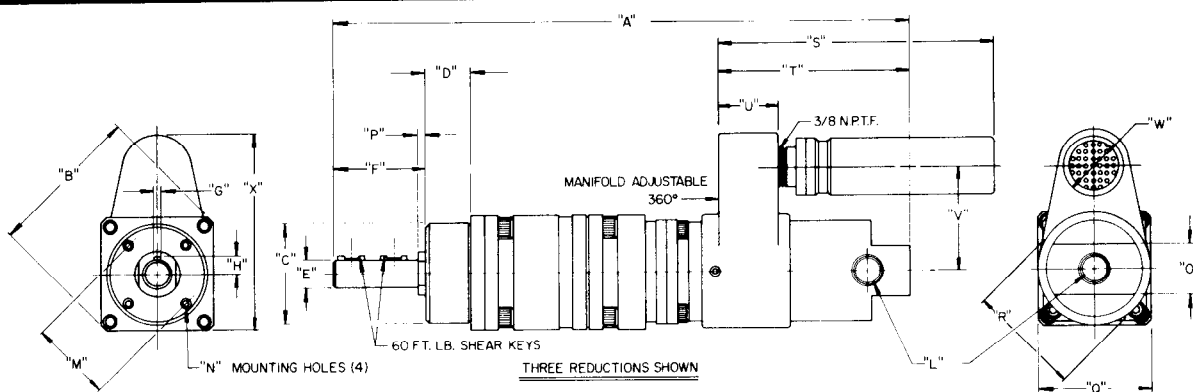


TYPICAL CROSS SECTION OF TOOLS

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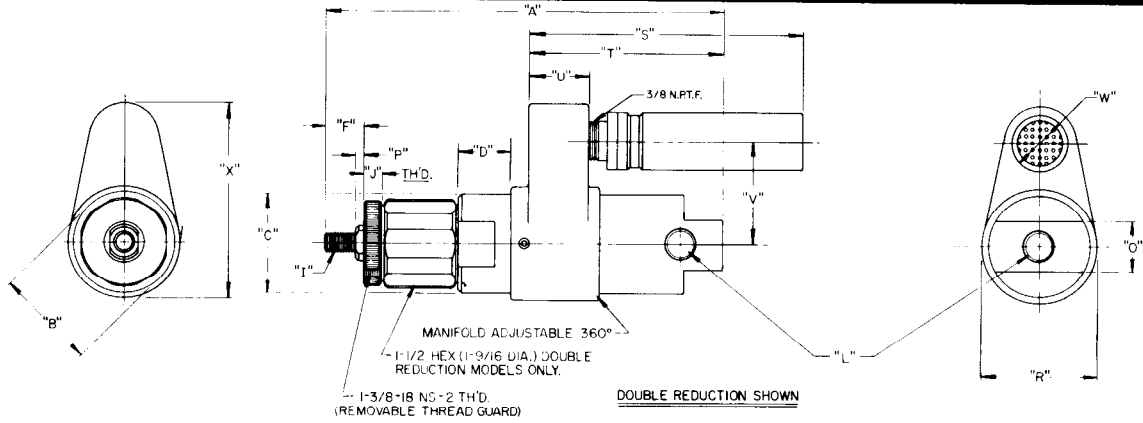
DIMENSIONAL DATA



MODELS	GEAR REDUCTION	A
8226-1 } A	2 RED'S.	8-11/16 (221 MM)
	3 RED'S.	10-1/2 (267 MM)

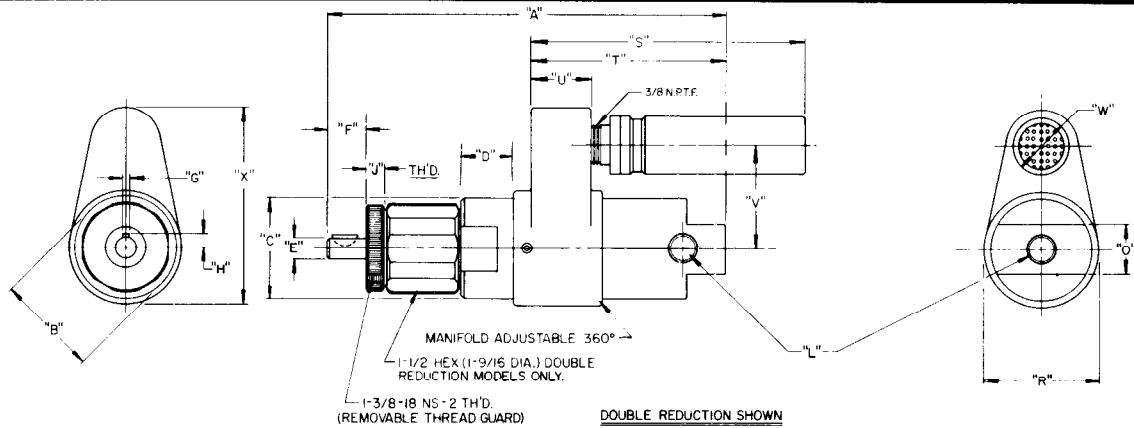
	B	C	D	E	F	G	H	L	M	N	O	P	Q	R	S	T	U	V	W	X
INCHES	2.11/16	1.7490 1.7495	.774 .818	.4990 .4995	1.604 1.655	.125 .126	.304 .314	1/4 N.P.T.F.	1.432 1.442	10-24 UNC-2B	7/8	.098 .164	2	2	4 7/8	3.13/32	1-1/16	1.13/16	1	3 7/16
MM	68	44.4246 44.4373	19.659 20.773	12.6746 12.6873	40.741 42.037	3.175 3.200	7.721 7.975	AIR INLET	36.372 36.626	TH'D.	22	2.489 4.165	51	51	124	86	27	46	25	87

DIMENSIONAL DATA



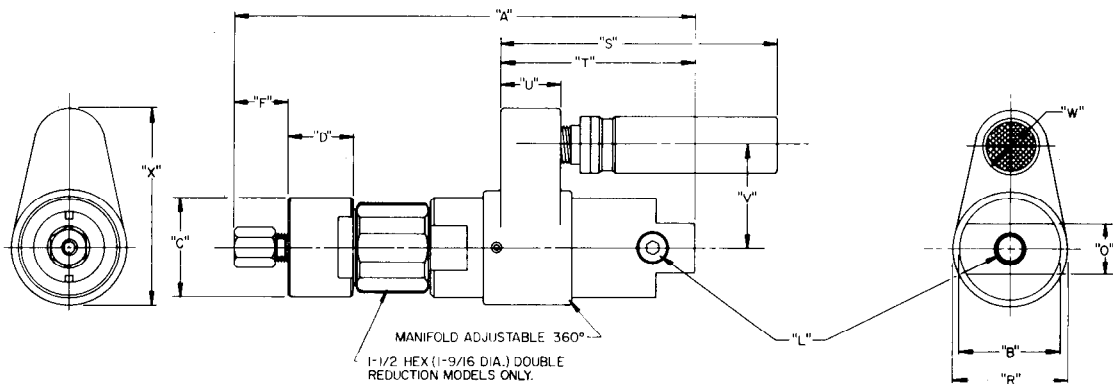
MODELS	GEAR REDUCTION	A
8229- ()-A	SINGLE	5-3/4 (146 MM)
	DOUBLE	7-1/16 (179 MM)

	B	C	D	F	I	J	L	O	P	R	S	T	U	V	W	X
INCHES	1-3/4	1.730 1.740	.960 .980	.688 .740	3/8-24 UNF. 3A TH.D.	.270 .292	1/4 N.P.T.F. AIR INLET	7/8	.163 .203	2	4-7/8	3-13/32	1-1/16	1-13/16	1	3-7/16
MM	44	43.924 44.196	24.384 24.892	17.475 18.796		6.858 7.416		22	4.140 5.156	51	124	86	27	46	25	87



MODELS	GEAR REDUCTION	A
8230- ()-A	SINGLE	5-3/4 (146 MM)
	DOUBLE	7-1/16 (179 MM)

	B	C	D	E	F	G	H	J	L	O	R	S	T	U	V	W	X
INCHES	1-3/4	1.730 1.740	.960 .980	.3748 .3751	.688 .740	.0938 .0948	.228 .238	.270 .292	1/4 N.P.T.F. AIR INLET	7/8	2	4-7/8	3-13/32	1-1/16	1-13/16	1	3-7/16
MM	44	43.942 44.196	24.384 24.892	9.5199 9.5275	17.475 18.796	2.3825 2.4079	5.791 6.045	6.858 7.416		22	51	124	86	27	46	25	87



MODELS	GEAR REDUCTION	A
8232- ()	SINGLE	6-7/8 (175 MM)
	DOUBLE	8-3/16 (206 MM)

	B	C	D	F	L	O	R	S	T	U	V	W	X
INCHES	1-3/4	1.748 1.750	1.5/32	15/16 (APPROX.)	1/4 N.P.T.F. AIR INLET	7/8	2	4-7/8	3-13/32	1-1/16	1-13/16	1	3-7/16
MM	44	44.424 44.450	29	24		22	51	124	86	27	46	25	87